

AD-A110 118

FLAHERTY-SIAVARA ASSOCIATES NEW HAVEN CT
NATIONAL DAM SAFETY PROGRAM, NOE POND DAM (INVENTORY NUMBER NY --ETC(U)
JUL 81 H C FLAHERTY

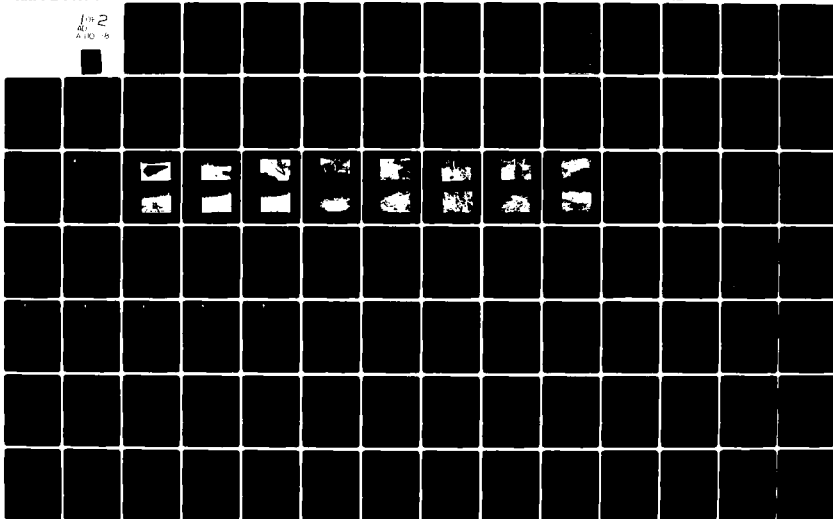
F/S 13/13

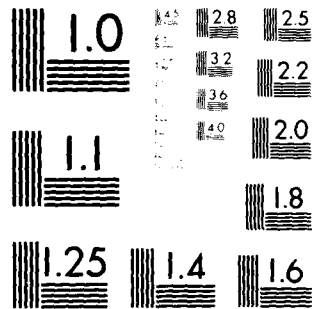
DACW51-81-C-0006

ML

IBM: ACCTSTP

1 of 2
AL
A110-118





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

AD A110118

LEVEL

SUSQUEHANNA RIVER BASIN

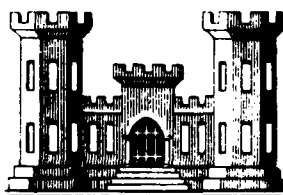
①

MOE POND DAM

OTSEGO COUNTY, NEW YORK
INVENTORY No. NY 1269

DTIC
COLLECTED
JAN 25 1982
H

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



DTIC FILE COPY

~~original contained in
plates. All DTIC requests
will be in black and
white.~~

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

NEW YORK DISTRICT, CORPS OF ENGINEERS
JULY 1981

412 599

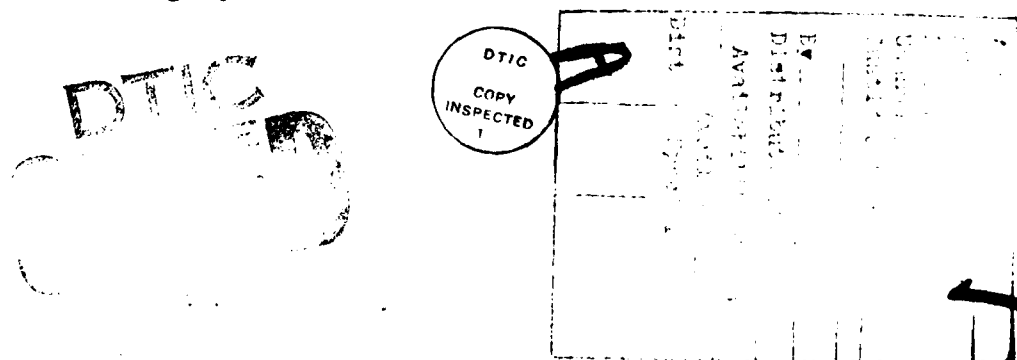
PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analysis. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MOE POND DAM
INVENTORY NO. NY 1269
SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY, NEW YORK

TABLE OF CONTENTS

	<u>PAGE NO.</u>
ASSESSMENT	-
OVERVIEW PHOTOGRAPH	-
LOCATION MAP	i
1 - PROJECT INFORMATION	1
1.1 GENERAL	1
1.2 DESCRIPTION OF PROJECT	1
1.3 PERTINENT DATA	3
2 - ENGINEERING DATA	5
2.1 GEOTECHNICAL DATA	5
2.2 DESIGN RECORDS	5
2.3 CONSTRUCTION RECORDS	5
2.4 OPERATION RECORDS	6
2.5 EVALUATION OF DATA	6
3 - VISUAL INSPECTION	7
3.1 FINDINGS	7
3.2 EVALUATION OF OBSERVATIONS	9
4 - OPERATION AND MAINTENANCE PROCEDURES	11
4.1 PROCEDURE	11
4.2 MAINTENANCE OF DAM	11
4.3 WARNING SYSTEM	11
4.4 EVALUATION	11

5 - HYDROLOGIC/HYDRAULIC	12
5.1 DRAINAGE AREA CHARACTERISTICS	12
5.2 ANALYSIS CRITERIA	12
5.3 SPILLWAY CAPACITY	12
5.4 RESERVOIR CAPACITY	13
5.5 FLOODS OF RECORD	13
5.6 OVERTOPPING POTENTIAL	13
5.7 EVALUATION	14
6 - STRUCTURAL STABILITY	15
6.1 EVALUATION OF STRUCTURAL STABILITY	15
6.2 STRUCTURAL STABILITY ANALYSIS	16
7 - ASSESSMENT/RECOMMENDATIONS	18
7.1 ASSESSMENT	18
7.2 RECOMMENDED MEASURES	19

APPENDICES

- A. PHOTOGRAPHS
- B. VISUAL INSPECTION CHECKLIST
- C. HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS
- D. PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS
- E. STRUCTURAL STABILITY ANALYSIS
- F. REFERENCES
- G. DRAWINGS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Moe Pond Dam
State Located: New York
County: Otsego
Watershed: Susquehanna River Basin
Watercourse: Willow Brook
Date of Inspection: April 9, 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies that need to be evaluated and remedied.

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped by all storms exceeding 62 percent of the Probable Maximum Flood (PMF). Consequently, the spillway cannot adequately discharge the peak outflow from the full PMF; however, it will pass one half the PMF. Therefore, the spillway is adjudged to be inadequate.

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. The present embankment sections adjacent to the spillway represent a potential hazard to the dam with respect to possible erosion, piping and/or failure of the dam during high reservoir levels. Therefore, regrade this area to make the embankment section conform to the embankment cross sections elsewhere. In addition, adequately protect these sections from spillway outflows.
2. Investigate the seepage that was observed near the downstream toe of slope, including observation during high and low reservoir levels, evaluate the cause and recommend appropriate remedial measures.

It is recommended that within 3 months of the final approval date of this report, all of the additional investigations should be initiated and within 18 months, appropriate remedial measures

should be completed.

The following remedial measures should be completed within 12 months to correct existing deficiencies:


1. Fill and regrade the major depression between the drop structure and the spillway, as well as the other local depressions along the embankment crest and downstream slope to restore a uniform embankment cross section. Reestablish vegetative cover in these areas.
2. Clear the brush and trees from the embankment, including stump removal and backfilling, establish a vegetative cover, and cut grass and weeds on the embankment at least annually.
3. Flatten the grade at the top of the upstream slope and provide riprap or alternate slope protection as required between the crest and the existing riprap to prevent future slumping and erosion due to wave action.
4. Ensure the reservoir drain and its controls are operational.
5. Repair the deteriorated concrete of the spillway and outlet works endwall.
6. Fill in the woodchuck burrow and any other burrows observed on the embankment slopes.
7. Remove all logs, debris and other obstructions from the spillway area.
8. Develop and implement a flood warning and emergency evacuation plan to alert downstream residents in the event conditions occur which could result in the failure of the dam.

9. A program for regular maintenance should be developed and implemented.

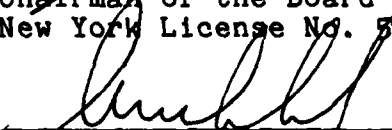
14 - 99

Submitted by:

FLAHERTY GIAVARA ASSOCIATES, P.C.


Hugh C. Flaherty, P.E. & L.S.
Chairman of the Board
New York License No. 58508

Approved by:


Col. W. M. Smith, Jr.
New York District Engineer

Date:

14 Sep 81

NATIONAL DAM SAFETY PROGRAM
PHASE I INSPECTION REPORT
MOE POND DAM
INVENTORY NO. NY 1269
SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367. Flaherty Giavara Associates, P.C. has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to Flaherty Giavara Associates, P.C. under a letter of December 24, 1980 from W. M. Smith Jr., Colonel, Corps of Engineers. Contract No. DACW 51-81-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

Moe Pond Dam consists of an earthfill embankment with a concrete spillway located near the left abutment. A concrete structure is located on the crest near the center of the dam. It appears to be a gate structure connecting to an 18 inch diameter cast iron pipe that outlets into the main discharge channel. The overall length of the dam is 222 feet. A plan, profile and section of the dam are shown in Appendix G.

The crest of the dam is 17.5 feet above the discharge channel and the crest width is approximately 12 feet. The upstream earthen slope varies from near vertical to 2 horizontal to 1 vertical from the crest to the reservoir level (a distance of 3+ feet at the time of visual inspection). Below the reservoir level, the upstream

slope appears to be much flatter and riprap-lined. The downstream slope is 2 horizontal to 1 vertical from the crest to a relatively flat berm about 9 to 10 feet below the crest. The downstream berm covers approximately the middle half of the dam and subsequently drops at slopes varying from 1.5 to 2 horizontal to 1 vertical, to the discharge channel, 7± feet below the berm.

Based on the 1934 drawings, the embankment consists of earthfill surrounding an interior concrete core. The core consists of a concrete wall with concrete fill on the downstream side. The wall begins several feet below the crest and extends below original ground surface to depths ranging from 4 to 15 feet to form a foundation cutoff. The core wall is 2 feet wide at its top and increases, in steps, to a 6 foot width at the bottom of the cutoff.

The spillway is approximately 15 feet wide, and consists of a concrete gravity section with no upstream or downstream retaining or abutment walls. The spillway discharge channel is about 7 feet wide and is excavated into earth about 2 feet. The channel retains this cross section and is gently sloping for a distance of 100+ feet downstream of the spillway. Thereafter, it curves to the right and fans out over a 20 to 30 foot width creating several narrow, very shallow channels, all of which drop steeply into the main discharge channel.

b. Location

Moe Pond Dam is located off New York Route 28/80 approximately 1.3 miles northwest of the Village of Cooperstown in the Town of Otsego, New York. The dam is located at latitude north 42°-42.8' and longitude west 74°-56.7' on the U.S. Geological Survey 7.5 minute series topographic map "Cooperstown, New York". The Location Map on page i indicates where the dam is situated.

c. Size Classification

The maximum height of the dam is 27 feet and the maximum storage capacity is 295 acre-feet. Therefore, Moe Pond Dam is classified as a "Small" dam as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

There are seven roads (including New York State Routes 28 and 28/80), a railroad, numerous dwellings and buildings (Cooperstown) as well as historic Doubleday Field within the dam failure flood hazard area. Therefore, the dam is in the "High" hazard category as defined by the Recom-

mended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the State University of New York (SUNY) at Oneonta. The address and telephone number are as follows:

Owner

Contact: Dr. Williard N. Harman
Biology Department
State University College
Oneonta, New York 13820

Telephone: (607) 431-3703

f. Purpose

The primary purpose of this dam is the creation of an impoundment for the study of wildlife habitat.

g. Design and Construction History

The dam was designed by Wm. Carter Burnett in October, 1934 and constructed by the Leatherstocking Corporation of Cooperstown, New York in the mid 1930's.

h. Normal Operating Procedure

There are no regular operating procedures for this dam. The normal water level in the reservoir is maintained by the crest elevation of the spillway at approximately 1630.0 (NGVD).

1.3 PERTINENT DATA

a. <u>Drainage Area (Square Miles)</u>	0.26
b. <u>Discharge at Dam Site (CFS)</u>	
- Top of Dam	178
- Crest of Spillway	-
- Reservoir Drain Inlet	-
c. <u>Elevations (NGVD - estimated)</u>	
- Top of Dam	1632.5
- Crest of Spillway	1630.0
- Reservoir Drain Inlet	-

d. Reservoir Surface Area (Acres)

- Top of Dam	39
- Crest of Spillway	37
- Reservoir Drain Inlet	-

e. Storage (Acre-Feet)

- Top of Dam	295
- Crest of Spillway	200
- Reservoir Drain Inlet	-

f. Dam

- Type: Earthfill with a concrete core and intermediate berm	
- Length (Feet)	222
- Upstream Slope (H:V)	-
above reservoir	0.5-2.0:1
below reservoir	less than 2:1
- Downstream Slope (H:V)	2:1
- Crest Width (Feet)	12±

g. Spillway

- Type: Stepped concrete weir and earthen discharge channel	
- Length (Feet)	15
- Width (Feet)	5±
- Side Slopes (H:V)	vertical
- Channel Bottom Slope (Feet/Foot)	-
- Control: None	

h. Reservoir Drain

- Type: 18 inch diameter cast iron pipe (62 feet long)	
- Control: 18 inch diameter slide gate located at centerline of dam	

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

Moe Pond Dam is located on Willow Brook, a southeasterly flowing tributary to Otsego Lake which is the headwaters of the Susquehanna River. It is about 1.3 miles northwest of the Village of Cooperstown and lies in the Allegheny Plateau physiographic province of New York State. Local topography ranges from elevation 1600 in the streambed below the dam to elevation 1820 atop the hill directly east of Moe Pond.

Bedrock in the vicinity of the site consists of the Panther Mountain Formation belonging to Middle Devonian Hamilton group. This formation consists of medium to fine-bedded, medium to coarse-grained silty shales, siltstones and sandstones. Cross bedding, ripple marks and other high current sedimentary structures are abundant. This unit was probably deposited in a near-shore delta platform setting within the Catskill Delta Complex which prograded across the state from east to west.

Above the bedrock, some or all of the valley bottom may be mantled with glacial till, a heterogeneous mixture of clay, silt, sand, gravel and cobbles, deposited at the base of ice sheets which once covered the region. This in turn may be overlain by well-sorted sands and gravels deposited by glacial meltwater or subsidiary tributary streams.

b. Subsurface Conditions

There are no known records of subsurface explorations at the site of Moe Pond Dam.

2.2 DESIGN RECORDS

Moe Pond Dam was designed by Wm. Carter Burnett in October, 1934; however, no records were obtained concerning the original design of the dam.

2.3 CONSTRUCTION RECORDS

This dam was constructed in the mid 1930's by the Leatherstocking Corporation. A plan, profile and section of the dam dated October, 1934 and obtained from the Leatherstocking Corporation are included in Appendix G; however, no other construction records were available.

2.4 OPERATION RECORDS

No operation records were obtained for this dam.

2.5 EVALUATION OF DATA

The data presented herein was obtained primarily from the files of the New York State Department of Environmental Conservation (DEC) and from the Leatherstocking Corporation in Cooperstown, New York. This information appears to be reliable and adequate for the purposes of a Phase I Inspection Report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

A visual inspection of Moe Pond Dam was conducted on April 9, 1981. The weather was mostly overcast and the temperature was 60+°F. At the time of the inspection, there was water flowing over the spillway weir (See Photo No. 10).

b. Dam

The earthfill embankment of the dam is generally in poor condition (See Photos No. 3, 4, 5, 6 and 7). Although somewhat obscured by heavy vegetative growth, there was no visible evidence of major lateral movement or settlement of the embankments. However, a significant depression was noted on the downstream side of the crest and active seepage was observed near the downstream toe.

The following specific items were noted:

1. A zone of active seepage was observed at the downstream toe to the right of the concrete endwall for the outlet works (See Photos No. 14 and 15). The flow rate was estimated at 1+ gallons per minute (GPM) and the seepage appeared to be clear.
2. A depression was noted in the crest, downstream of the embankment centerline, midway between the gate structure and the spillway (See Photo No. 17). The depression is concave downstream. It measures about 13 feet along the downstream edge of the crest and cuts into the crest to form an arc that projects as much as 6 feet. The vertical displacement of this area ranges from 1 to 2 feet along the downstream edge of the crest to zero feet at the perimeter of the arc that projects into the crest. The cause of this depression is unknown, but it may have been due to erosion, sloughing or maintenance operations associated with cleanup of uprooted trees or other activities.
3. The crest of the dam (See Photo No. 3) contained several irregular depressions ranging up to 1 to 2 feet in diameter and about 6 to 12 inches deep. The upstream embankment slope above the reservoir level has experienced sloughing and erosion due to wave action such that they have a nearly vertical slope over most of the embankment length (See Photos No. 4 and 6).

4. There are no abutment or retaining walls between the spillway and the embankment (See Photo No. 10). The embankment narrows to a crest width of about 2 feet at the location of the spillway and drops to a depth of 6 inches below the top of the concrete spillway end sections (which in turn are about 12 inches below the embankment crest).
5. The slopes and crest of the embankment had a heavy cover of brush and trees ranging up to 18+ inches in diameter (See Photos No. 3, 4, 5, 6, and 7). Trees were overhanging the upstream slope above the rock riprap and one had been uprooted (See Photo No. 6). One other uprooted tree was noted in the downstream slope area.
6. A significant accumulation of logs and other debris was observed on and immediately upstream and downstream of the spillway (See Photos No. 10 and 11).
7. Woodchuck and other animal burrows were observed in the downstream slope (See Photo No. 16).
8. No flow was evident from the 18 inch diameter cast iron outlet pipe even though the bottom two-thirds of the pipe was below the water level in the discharge channel (See Photo No. 9). The pipe was also "silted-up" to approximately one half its diameter.

c. Spillway

1. Spillway Weir

This broad-crested concrete weir is located at the left central portion of the embankment, and is 15 feet wide. The weir was in a state of disrepair in that the concrete has been allowed to deteriorate over the years, debris has collected at its entrance (See Photo No. 10) and a logjam has formed a short distance downstream (See Photos No. 10 and 11).

2. Spillway Discharge Channel

The 7+ foot wide discharge channel is excavated into earth and discharges into the main discharge channel approximately 150 feet downstream of the spillway weir (See Photo No. 12). The channel has no erosion protection for either its bottom or its side slopes. Consequently, erosion is prevailing throughout (See Photos No. 11 and 12).

d. Reservoir Drain

1. Reservoir Drain and Outlet Works

The 18 inch diameter cast iron pipe has a submerged inlet, is controlled by a slide gate and valves (See Photo No. 8) and has a reinforced concrete endwall. The reservoir drain was in poor condition; the concrete endwall was severely deteriorated and the outlet pipe was nearly completely "silted-up" (See Photo No. 9). The reservoir drain was not operated during the inspection and it appeared it had not been operated in quite some time.

2. Main Discharge Channel

The earthen discharge channel has a bottom width of 10 feet, a length of approximately 150 feet and is heavily overgrown (See Photo No. 13).

e. Downstream Channel

The natural channel downstream of the dam has a width of 10+ feet, a depth of 6 inches, and is in fair condition, being heavily overgrown. The channel is alluvial and its streambed consists of various gradations of gravel.

f. Reservoir - Storage Pool Area

The reservoir area is bordered by moderately sloping woodlands (See Photo No. 2). There is no significant probability of landslides into the storage pool affecting the safety of the dam. Sedimentation is not considered to be a factor in the the safety of this dam.

3.2 EVALUATION OF OBSERVATIONS

Visual inspection revealed a number of deficiencies on this structure. The following items were noted:

- a. Active seepage was observed at the downstream toe of slope.
- b. A large depression was observed in the crest between the gate structure and the spillway.
- c. The crest of the dam has several irregular depressions and the upstream embankment slope has sloughed and eroded from wave action.
- d. There are no abutment or retaining walls between the spillway and embankment.

- e. The slopes and crest of the embankment had a heavy cover of brush and trees.
- f. A significant accumulation of logs and other debris was noted in proximity to the spillway.
- g. The spillway discharge channel has experienced moderate erosion.
- h. The concrete of the spillway weir and outlet works has deteriorated.
- i. The reservoir drain is severely "silted-up".
- j. The main discharge channel is heavily overgrown.
- k. Woodchuck and other animal burrows were evident in the downstream slope.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

The normal water surface level is maintained by the crest of the spillway weir at approximately elevation 1630.0 (NGVD). No operational procedures are in effect at this time.

4.2 MAINTENANCE OF DAM

It appears that the only maintenance procedures in effect include mowing and brush cutting of the embankment crest, as well as the removal of uprooted trees.

4.3 WARNING SYSTEM

No warning system is presently in effect.

4.4 EVALUATION

Presently, no operation and only a few maintenance procedures are in effect for this dam. Therefore, a program for regular maintenance should be developed and implemented.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The dam is located in the Town of Otsego on Willow Brook, approximately 11,000 feet upstream of Otsego Lake in Coopers-town, New York, which is the headwaters of the Susquehanna River.

The watershed (shown on the Watershed Map on Page C-5 in Appendix C) consists of 168 acres (0.26 square miles) of hilly uplands with typical slopes of 10 percent. Land within the watershed is primarily undeveloped with extensive woodlands. There are no significant waterbodies or wetlands upstream from the dam.

The watercourse upon which the reservoir is located, is a small perennial stream with a typical flow width of 10 feet and a typical flow depth of 6 inches.

5.2 ANALYSIS CRITERIA

The purpose of the hydrologic/hydraulic analysis is to evaluate the spillway capacity and the potential for overtopping. The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers' HEC-1 Computer Model - Dam Safety Version. The procedure included determining the Probable Maximum Flood (PMF) runoff from the watershed and routing the inflow hydrograph through the impoundment to determine the outflow hydrograph. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated.

The initial rainfall loss was assumed to be 1.0 inches, and the uniform rainfall loss was assumed to be 0.1 inches per hour. In accordance with recommended guidelines of the Corps of Engineers, the Probable Maximum Precipitation (PMP) was 19.3 inches (24 hour duration, 200 square mile area).

The analysis was conducted for both the full PMF and for several fractional PMF conditions. The PMF inflow of 660 CFS was routed through the reservoir and the peak outflow was determined to be 503 CFS.

5.3 SPILLWAY CAPACITY

The total outlet capacity is the discharge from the spillway. The spillway consists of a 15 foot long broad-crested concrete weir with 2.5 feet of allowable elevation head and an earthen discharge channel.

The stage discharge data for the spillway was calculated for the stages tabulated below:

<u>Stage (Feet)</u>	<u>Discharge Capacity (CFS)</u>	<u>Element of Structure</u>
1630.0	0	Spillway Crest
1630.5	16	--
1631.0	45	--
1631.5	83	--
1632.0	127	--
1632.5	178	Top of Dam

The total spillway capacity at the top of dam is 178 CFS.

5.4 RESERVOIR CAPACITY

The storage capacity of the reservoir was calculated for the stages indicated below:

<u>Stage (Feet)</u>	<u>Storage (Acre-Feet)</u>	<u>Storage (Inches of Runoff)</u>
1630.0	200	14.29
1632.5	295	21.07

5.5 FLOODS OF RECORD

No data regarding flood levels was obtained for this dam.

5.6 OVERTOPPING POTENTIAL

The results of the HEC-1 DB computer analysis indicate that the crest of the dam is overtopped by all storms exceeding 62 percent of the PMF event. The PMF discharge rate of 503 cubic feet per second (CFS) would occur at a peak flood stage of 1633.1 feet, which is 0.6 feet above the crest of the dam.

The results of the analysis are tabulated below:

<u>Flood Condition</u>	<u>Peak Inflow (CFS)</u>	<u>Peak Outflow (CFS)</u>	<u>Maximum Stage Elevation (NGVD)</u>
0.5 PMF	330	135	1632.1
1.0 PMF	660	503	1633.1

5.7 EVALUATION

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, it has been determined that the capacity of the spillway is not adequate to pass the full PMF, but it will pass one half the PMF; approximately 62 percent of the PMF can be safely passed before overtopping will occur. The PMF event would overtop the dam for a duration of 4 hours and the maximum depth of flow over the crest would be 0.6 feet. Therefore, the spillway is adjudged to be inadequate.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

There was no visible evidence of major settlement, lateral movement or overall structural instability of the dam during the site examination. Based on the conditions that were observed, there is no reason to question the static structural stability of the dam; however, both the active seepage and the continued erosion or sloughing of the upstream and downstream slopes near the crest represent a potential hazard to the overall integrity of the dam.

b. Design and Construction Data

There is no construction data to confirm the nature and actual physical properties of the earthfill in the embankment. However, the dam proportions are considered to be reasonable for the soils that were available at the site and therefore, the dam would be expected to have an adequate safety margin with respect to overall stability under static loading conditions.

c. Operating Records

No operating records were obtained for Moe Pond Dam.

d. Post Construction Changes

The 1934 drawings for Moe Pond Dam in Appendix G show a configuration for the dam and spillway that generally corresponds to the conditions observed during the visual examination of April 9, 1981, except for the following:

1. The observed embankment crest width was approximately 12 feet, whereas the crest width shown on the plans was 6 feet.
2. A berm has apparently been constructed on the downstream slope; this berm does not appear on the 1934 drawings.
3. The spillway shown on the drawings had a stepped concrete discharge apron; however, no such apron was constructed.
4. The reservoir drain which was noted during the inspection was an 18 inch diameter cast iron pipe; whereas, the plans showed a 3 foot square concrete box conduit.

6.2 STRUCTURAL STABILITY ANALYSIS

Available drawings show the concrete core wall and dimensions. As part of the present study, stability computations have been performed. Without the passive resistance of the material downstream of the spillway, the stability of the core wall section at the spillway would be unacceptable.

The stability analysis is presented in Appendix E. The results of the stability computations are summarized in the following table:

<u>Loading Condition (Spillway Section)</u>	¹ Factors of Safety		³ Location of Resultant Passing Through Base
	<u>Over- turning</u>	² <u>Sliding</u>	
1. Normal operating condition: water level at 1 foot above spillway crest	2.55	4.48	N/A
2. Maximum operating condition: water level at top of dam (2.5 feet above spillway crest)	2.25	4.03	N/A
3. Full PMF condition: water level at El. 1633.0 (3.0 feet above spillway crest)	2.17	3.92	N/A
4. Ice loading condition: 5.0 Kips per foot acting at top of spillway	1.59	3.44	N/A

¹These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding.

²As determined applying the friction-shear method

³Since stability of the cross section depends on passive soil pressure, this ratio is not meaningful.

The analysis indicates that with the consolidated material downstream of the spillway in place, the factors of safety for overturning were acceptable for all cases of loading except the ice loading condition.

Since the passive soil pressure is much greater than the active loadings, all factors of safety for sliding were within acceptable limits.

This analysis applies to a concrete core wall which is continuous across the spillway. It also assumes consolidated material providing passive resistance to movement; should this downstream material erode or be removed by excavation, static instability could result.

Moe Pond Dam is located in Seismic Zone 2, and in accordance with recommended Phase I guidelines does not require separate seismic analysis.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Condition

On the basis of the visual examination, there were no signs of impending structural failure or other conditions which would warrant urgent remedial action; however, a number of serious deficiencies were noted.

b. Adequacy of Information

Since there were no drawings available, the evaluation of this dam is based primarily on visual examination, limited measurements at the site, approximate hydraulic and hydrologic computations, and application of engineering judgement. The available information that was obtained is adequate for the purposes of a Phase I assessment.

c. Need for Additional Investigations

It is recommended that the following additional investigations be performed by a registered professional engineer engaged by the owner:

1. The present embankment sections adjacent to the spillway represent a potential hazard to the dam with respect to possible erosion, piping and/or failure of the dam during high reservoir levels. Therefore, regrade this area to make the embankment section conform to the embankment cross sections elsewhere. In addition, adequately protect these sections from spillway outflows.
2. Investigate the seepage that was observed near the downstream toe of slope, including observation during high and low reservoir levels, evaluate the cause and recommend appropriate remedial measures.

d. Urgency

It is recommended that within 3 months of the final approval date of this report, all of the additional investigations should be initiated and within 18 months, appropriate remedial measures should be completed. The corrective measures listed in Section 7.2 should be accomplished within 12 months of final approval.

7.2 RECOMMENDED MEASURES

It is considered important that the following items be accomplished in addition to any items required as a result of the additional investigations recommended in Section 7.1c:

- a. Fill and regrade the major depression between the drop structure and the spillway, as well as the other local depressions along the embankment crest and downstream slope to restore a uniform embankment cross section. Re-establish vegetative cover in these areas.
- b. Clear the brush and trees from the embankment, including stump removal and backfilling, establish a vegetative cover, and cut grass and weeds on the embankment at least annually.
- c. Flatten the grade at the top of the upstream slope and provide riprap or alternate slope protection as required between the crest and the existing riprap to prevent future slumping and erosion due to wave action.
- d. Ensure the reservoir drain and its controls are operational.
- e. Repair the deteriorated concrete of the spillway and outlet works endwall.
- f. Fill in the woodchuck burrow and any other burrows noted in the embankment slopes.
- g. Remove all logs, debris and other obstructions from the spillway area.
- h. Develop and implement a flood warning and emergency evacuation plan which would be implemented to alert the downstream residents in the event conditions occur which could result in the failure of the dam.
- i. A program for regular maintenance should be developed and implemented.

APPENDIX A
PHOTOGRAPHS

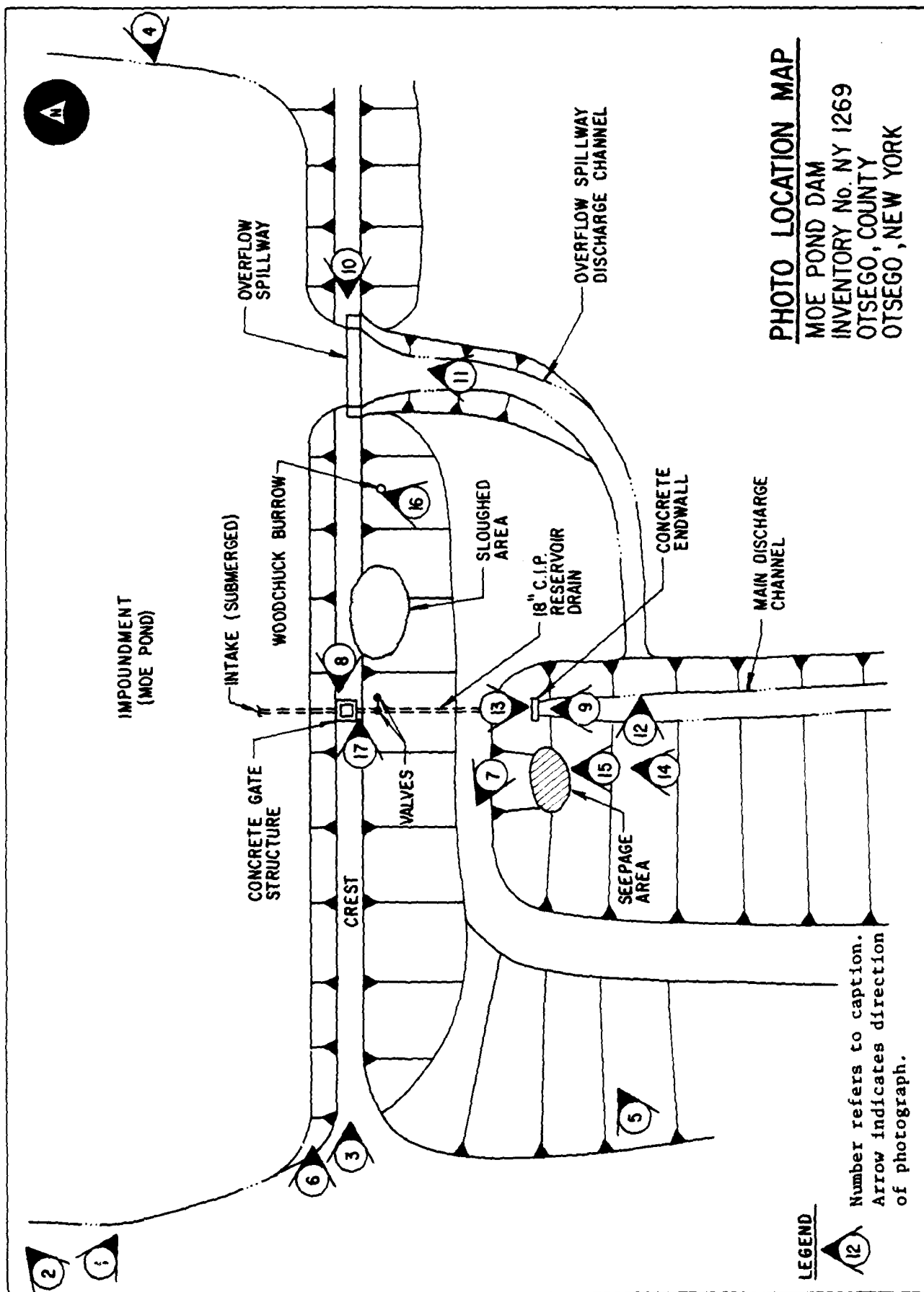




PHOTO #2: Overview of impoundment



PHOTO #3: Crest of dam looking toward
left abutment



PHOTO #4: Overview of upstream face of dam



PHOTO #5: Overview of downstream face of dam



PHOTO #6: Upstream face of dam



PHOTO #7: Downstream face of dam



PHOTO #8: Gate structure and valves



PHOTO #9: Outlet works



PHOTO #10: Crest of spillway



PHOTO #11: Spillway discharge channel looking upstream



PHOTO #12: Spillway discharge channel exit into main discharge channel



PHOTO #13: Downstream channel conditions



PHOTO #14: Seepage located to the right of outlet works



PHOTO #15: Close-up of seepage



PHOTO #16: Woodchuck burrow on downstream slope



PHOTO #17: Depression in downstream slope
between gate structure and
spillway

APPENDIX B
VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Moe Pond Dam
Fed. I.D. # NY 1269 DEC Dam No. ---
River Basin Susquehanna
Location: Town Otsego County Otsego
Stream Name Willow Brook
Tributary of Otsego Lake (Susquehanna River)
Latitude (N) 42° - 42.8' Longitude (W) 74° - 56.7'
Type of Dam Earthfill embankment with a concrete overflow spillway
Hazard Category High
Date(s) of Inspection April 9, 1981
Weather Conditions Overcast, 60° ± F.
Reservoir Level at Time of Inspection Elevation 1630.1 ± (NGVD)

b. Inspection Personnel T. L. Ward & R. A. Criscuolo of Flaherty Giavara Associates
P. C.; J. J. Rixner of Haley & Aldrich, Inc.; B. McL. Whittingham of Salmon
Associates.

c. Persons Contacted (Including Address & Phone No.)
Dr. Williard N. Harman John Hohenfeldt, Building Manager
Biology Department Biological Field Station
State University College State University College
Oneonta, New York 13820 Cooperstown, New York 13326
(607) 431-3703 (607) 547-8778

d. History:

Date Constructed Mid 1930's Date(s) Reconstructed _____
Designer Wm. Carter Burnett
Constructed By Leatherstocking Corporation
Owner State University of New York (SUNY) at Oneonta

2) Embankment

a. Characteristics

- (1) Embankment Material Unknown
- (2) Cutoff Type Core wall
- (3) Impervious Core Concrete core wall
- (4) Internal Drainage System None observed
- (5) Miscellaneous No comments

b. Crest

- (1) Vertical Alignment Fair; surface generally irregular; rutting in footpath; surface erosion and 12+ foot wide depression between gate structure and spillway
- (2) Horizontal Alignment Good; substantially straight
- (3) Surface Cracks None observed except at uprooted tree
- (4) Miscellaneous Surface irregular, depressions up to approximately 1.0 foot deep; grass, brush, small trees and footpath

c. Upstream Slope

- (1) Slope (Estimate - V:H) 1:3
- (2) Undesirable Growth or Debris, Animal Burrows Numerous trees and shrubs; uprooted tree adjacent to right abutment; no animal burrows were noted
- (3) Sloughing, Subsidence or Depressions Some surface erosion noted; shallow surface sloughing observed, apparently from wave action

(4) Slope Protection Blocky to flat riprap noted in reservoir

(5) Surface Cracks or Movement at Toe None evident

d. Downstream Slope

(1) Slope (Estimate - V:H) 1:2.5

(2) Undesirable Growth or Debris, Animal Burrows Brush, grass and trees 18 to 24 inches in diameter; numerous woodchuck burrows

(3) Sloughing, Subsidence or Depressions Surface generally irregular; surface erosion and 12+ foot wide depression between gate structure and spillway

(4) Surface Cracks or Movement at Toe None apparent; however, slope is very irregular

(5) Seepage Wet area observed to the right of outlet works at approximately the same elevation

(6) External Drainage System (Ditches, Trenches, Blanket) None apparent

(7) Condition Around Outlet Structure Reinforced concrete endwall was severely deteriorated; outlet pipe was almost completely "silted-in"

(8) Seepage Beyond Toe None evident

e. Abutments - Embankment Contact

Left: Good condition

Right: Good condition

(1) Erosion at Contact None observed

(2) Seepage Along Contact None evident

3) Drainage System

a. Description of System Broad-crested concrete weir and earthen discharge channel leading to the main discharge channel

b. Condition of System Poor; concrete of the spillway weir is deteriorated; debris has collected at the spillway entrance; a logjam has formed just downstream from the spillway weir

c. Discharge from Drainage System Earthen discharge channel leading to main discharge channel

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Peizometers, Etc.)

None observed

5) Reservoir

- a. Slopes Moderately sloping woodlands
- b. Sedimentation None observed
- c. Unusual Conditions Which Affect Dam None noted

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Numerous dwellings and buildings (Cooperstown), historic Doubleday Field, a railroad and seven roads (including New York State Routes 28 and 80) are within the dam failure flood hazard area
- b. Seepage, Unusual Growth None observed
- c. Evidence of Movement Beyond Toe of Dam None evident
- d. Condition of Downstream Channel Fair; channel is unprotected against erosion and heavily overgrown

7) Spillway(s) (Including Discharge Conveyance Channel)

Spillway and discharge channel

- a. General Spillway and discharge channel handle all flows
- b. Condition of Overflow Spillway Poor; concrete is deteriorated; debris has collected at the entrance to the spillway; a logjam has formed just downstream of the spillway

c. Condition of Emergency Spillway Not applicable

d. Condition of Discharge Conveyance Channel Fair condition; heavily overgrown
and no erosion protection

8) Reservoir Drain/Outlet

Type: Pipe X Conduit _____ Other _____

Material: Concrete _____ Metal Cast iron Other _____

Size: 18 inch Length 62 feet

Invert Elevations: Entrance Unknown (submerged) Exit Unknown (silted)

Physical Condition (Describe): _____ Unobservable _____

Material: Unknown

Joints: Unknown Alignment Unknown

Structural Integrity: Appears to be good

Hydraulic Capability: Poor; pipe is severely silted

Means of Control: Gate Slide gate Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Uncontrolled _____

Present Condition (Describe): Unknown, slide gate was not operated during
the inspection

9) Structural

- a. Concrete Surfaces Concrete of the spillway crest and of the endwall has
spalled and exposed some reinforcing; concrete of the gate structure
is in good condition
- b. Structural Cracking No evidence of any structural cracks
- c. Movement - Horizontal & Vertical Alignment (Settlement) None observed
- d. Junctions with Abutments or Embankments Fair; however, there are no spillway
retaining walls
- e. Drains - Foundation, Joint, Face None evident
- f. Water Passages, Conduits, Sluices Poor condition; endwall is severely
deteriorated, pipe is badly silted and spillway is clogged with debris
- g. Seepage or Leakage No signs of seepage or leakage

- h. Joints - Construction, etc. Good condition
- i. Foundation Inaccessible
- j. Abutments See 9) d. above
- k. Control Gates 18 inch diameter slide gate controls the reservoir drain
- l. Approach & Outlet Channels Not applicable
- m. Energy Dissipators (Plunge Pool, etc.) None evident
- n. Intake Structures Unknown
- o. Stability Appears to be stable
- p. Miscellaneous No comments

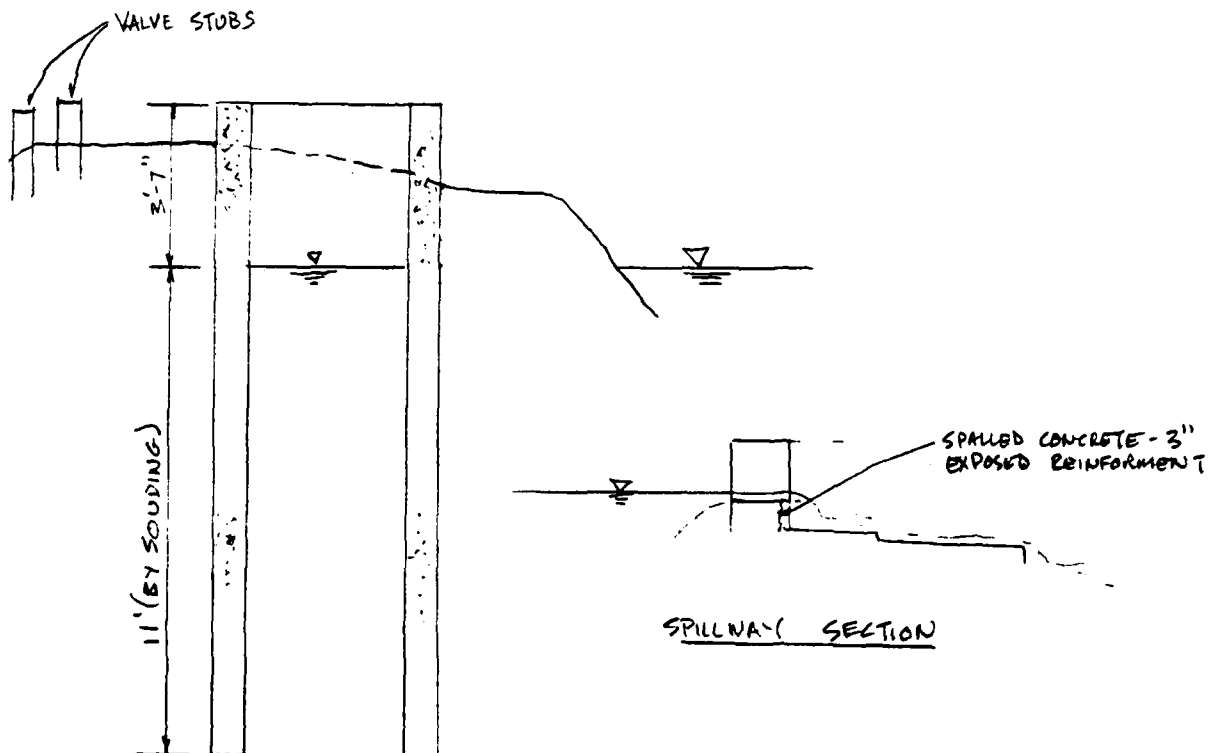
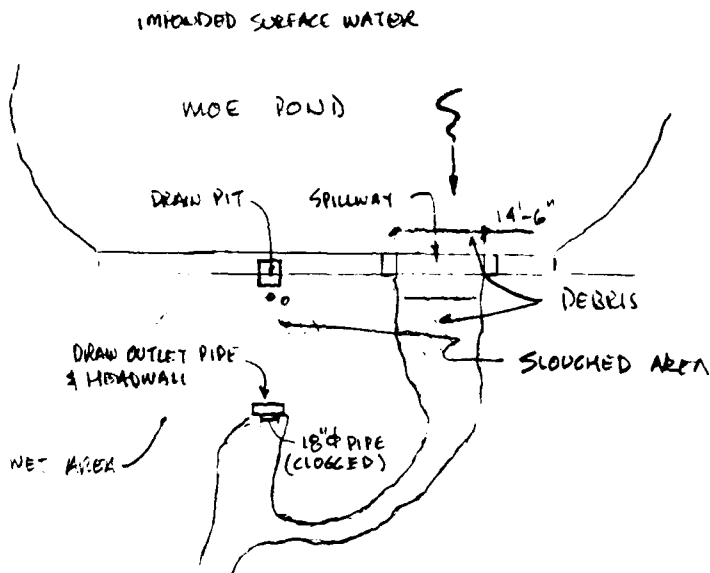
10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition None observed

[illegible]

SALMON ASSOCIATES • Consulting Engineers

BY FW DATE _____ SUBJECT MOE POND DAM - OTSEGO CO. SHEET NO. _____ OF _____
 CHKD. BY _____ DATE _____ FED. I.D. # 1265 JOB NO. 8041
 _____ N.Y. _____



DRAIN PIT SECTION

SPILLWAY SECTION

APPENDIX C .

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>1632.5</u>	<u>39</u>	<u>295</u>
2) Design High Water (Max. Design Pool)	<u>--</u>	<u>--</u>	<u>--</u>
3) Emergency Spillway Crest	<u>--</u>	<u>--</u>	<u>--</u>
4) Pool Level with Flashboards	<u>--</u>	<u>--</u>	<u>--</u>
5) Principal Spillway Crest	<u>1630.0</u>	<u>37</u>	<u>200</u>

DISCHARGES:

	<u>Volume</u> (cfs)
1) Average Daily	<u>Unknown</u>
2) Overflow Spillway @ Maximum High Water (Top of Dam)	<u>178</u>
3) Emergency Spillway @ Design High Water	<u>--</u>
4) Principal Spillway @ Emergency Spillway Crest	<u>--</u>
5) Low Level Outlet @ Principal Spillway Crest	<u>32</u>
6) Total (of all facilities) @ Maximum High Water	<u>210</u>
7) Maximum Known Flood	<u>Unknown</u>
8) At Time of Inspection	<u>1 +</u>

CREST:

ELEVATION: 1632.5 (NGVD)

Type Earthen embankment with a concrete core wall

Width 12+ feet

Length 222 feet

Spillover Concrete overflow spillway weir

Location Left center section of embankment

SPILLWAY:

PRINCIPAL

EMERGENCY

<u>1630.0 (NGVD)</u>	<u>Elevation</u>	<u></u>
<u>Broad-crested weir</u>	<u>Type</u>	<u></u>
<u>5+ feet</u>	<u>Width</u>	<u></u>
	<u>Type of Control</u>	
<u>Weir</u>	<u>Uncontrolled</u>	<u></u>
<u>--</u>	<u>Controlled</u>	<u></u>
<u>None</u>	<u>Type:</u>	<u></u>
	<u>(Flashboards; gate)</u>	
<u>One</u>	<u>Number</u>	<u></u>
<u>15 foot weir</u>	<u>Size/Length</u>	<u></u>
<u>Concrete</u>	<u>Invert Material</u>	<u></u>
<u>Continuously</u>	<u>Anticipated Length</u>	<u></u>
	<u>of Operating Service</u>	<u></u>
<u>Unknown</u>	<u>Chute Length</u>	<u></u>
<u>Unknown</u>	<u>Height Between</u>	<u></u>
	<u>Spillway Crest</u>	
	<u>& Approach Channel</u>	
	<u>Invert (Weir Flow)</u>	

Type: _____

Location: _____

Records:

Date Unknown

Max. Reading Unknown

FLOOD WATER CONTROL SYSTEM:

Warning System None in effect

Method of Controlled Releases (mechanisms) Manually controlled slide gate to
drain the impoundment

DRAINAGE AREA: 168 acres = 0.26 square miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type Rural, wildlife preserve for conservation and study

Terrain - Relief Rolling uplands

Surface - Soil Glacial till

Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

Primarily woodlands with scattered open fields; glacial till soils;

average watershed slope is 10 ± percent

Potential Sedimentation problem areas (natural or man-made; present or future)

None

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the reservoir perimeter:

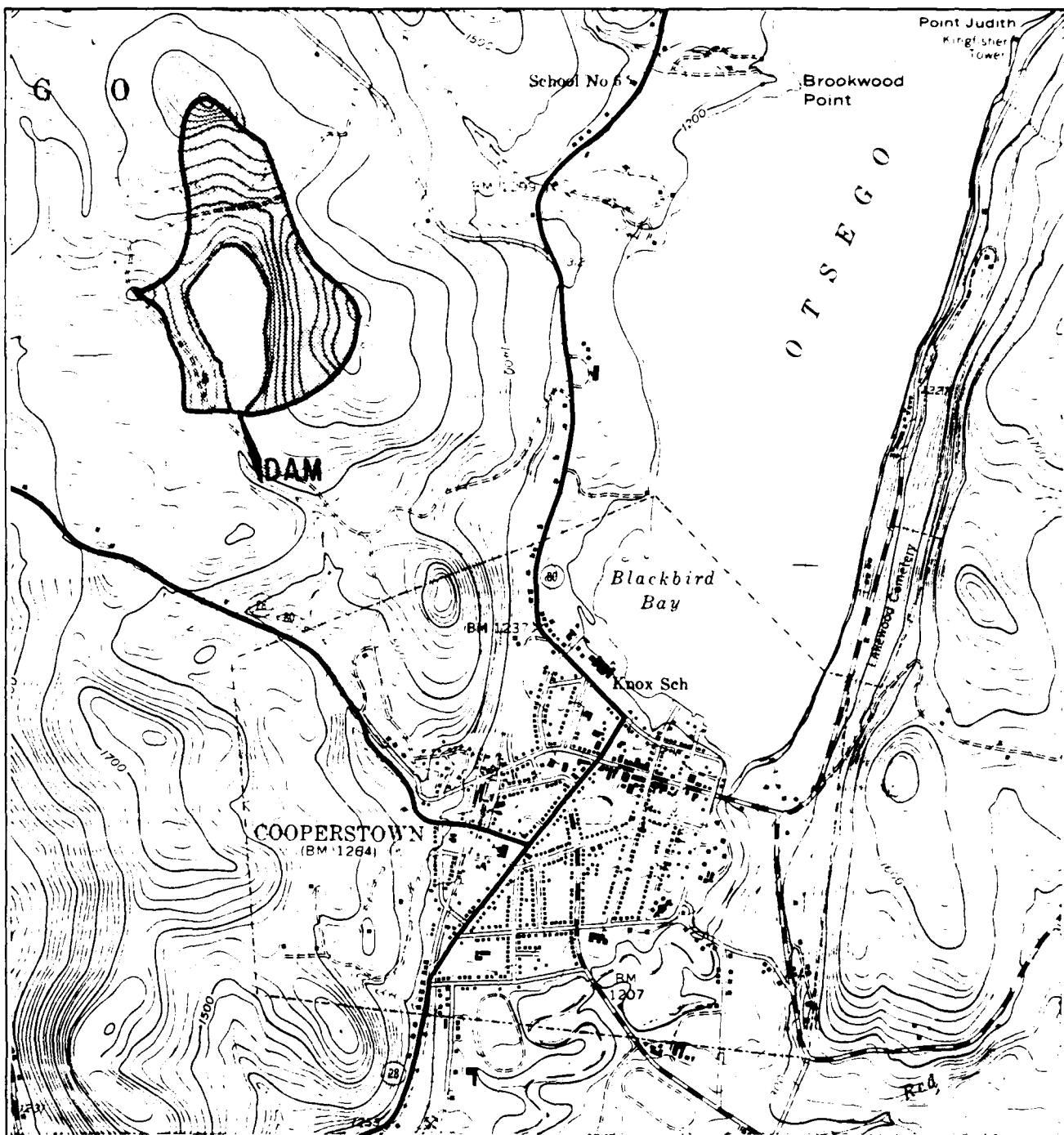
Location: None

Elevation: _____

Reservoir:

Length @ Maximum Pool 2,300 ± feet = 0.4 miles (Miles)

Length of Shoreline (@ Spillway Crest) 5,500 ± feet = 1.0 miles (Miles)



WATERSHED MAP

MOE POND DAM
INVENTORY No. NY 1269

SUSQUEHANNA RIVER BASIN
OTSEGO COUNTY
OTSEGO, NEW YORK

FLAHERTY • GIAVARA ASSOCIATES, P.C.

CALCULATIONS



WATERSHED DATA FOR HEC I SNYDER HYDROGRAPH

1) TIME TO PEAK

$$L = 4400 \text{ ft} = 0.83 \text{ miles}$$

$$L_c = 1900 \text{ ft} = 0.36 \text{ miles}$$

$C_t = 2.0$ for average slopes

$$T_p = C_t (L L_c)^{0.3}$$
$$= 2.0 (0.83 \times 0.36)^{0.3} = 1.39 \text{ Hours}$$

$$t_r = \frac{T_p}{5.5} = \frac{1.39}{5.5} = 0.25 \quad \text{USE } t_r = 0.5$$

$$t_{pR} = t_p + 0.25(t_R - t_r)$$
$$= 1.39 + 0.25(0.5 - 0.25) = 1.45 \text{ Hours}$$

2) % IMPERVIOUS

$$1 \text{ HOUSE } @ \approx 1000 \text{ ft}^2$$

$$1000 \text{ ft}^2 = 0.02 \text{ AC}$$

$$\frac{0.02}{1680} = 0.01 \%$$

3) WATERSHED AREA

$$1680 \text{ acres} / 640 = 0.26 \text{ mi}^2$$

PROJECT CORPS DAMS
NY 1269



FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN. 06510/203/786-1280

SHEET NO. 2 OF 4
BY RAC DATE 4-28-81
CHK'D BY TLW DATE 5-1-81

4) RAINFALL DATA (FROM HYDROMETEOROLOGICAL
REPORT NO. 33).

24 Hour Duration PMD = 19.3 inches for
300 square miles

<u>DURATION (HOURS)</u>	<u>Adj. Factor %</u>
6	111
12	122
24	133
48	143

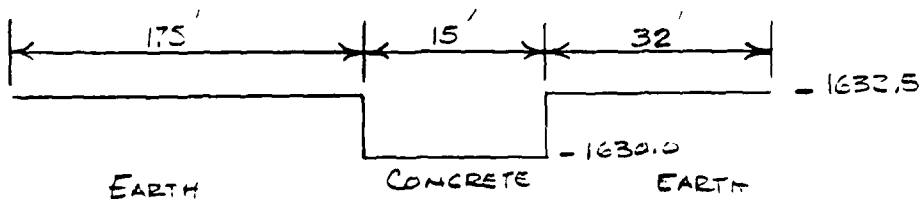
PROJECT 2000' DAM
NY 233



FLAHERTY-GIAVARA ASSOCIATES
 ENVIRONMENTAL DESIGN CONSULTANTS
 ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203/789-1280

SHEET NO. 5 OF 5
 BY RAC DATE 4-23-91
 CHK'D. BY TLW DATE 5-1-91

STAGE DISCHARGE DATA



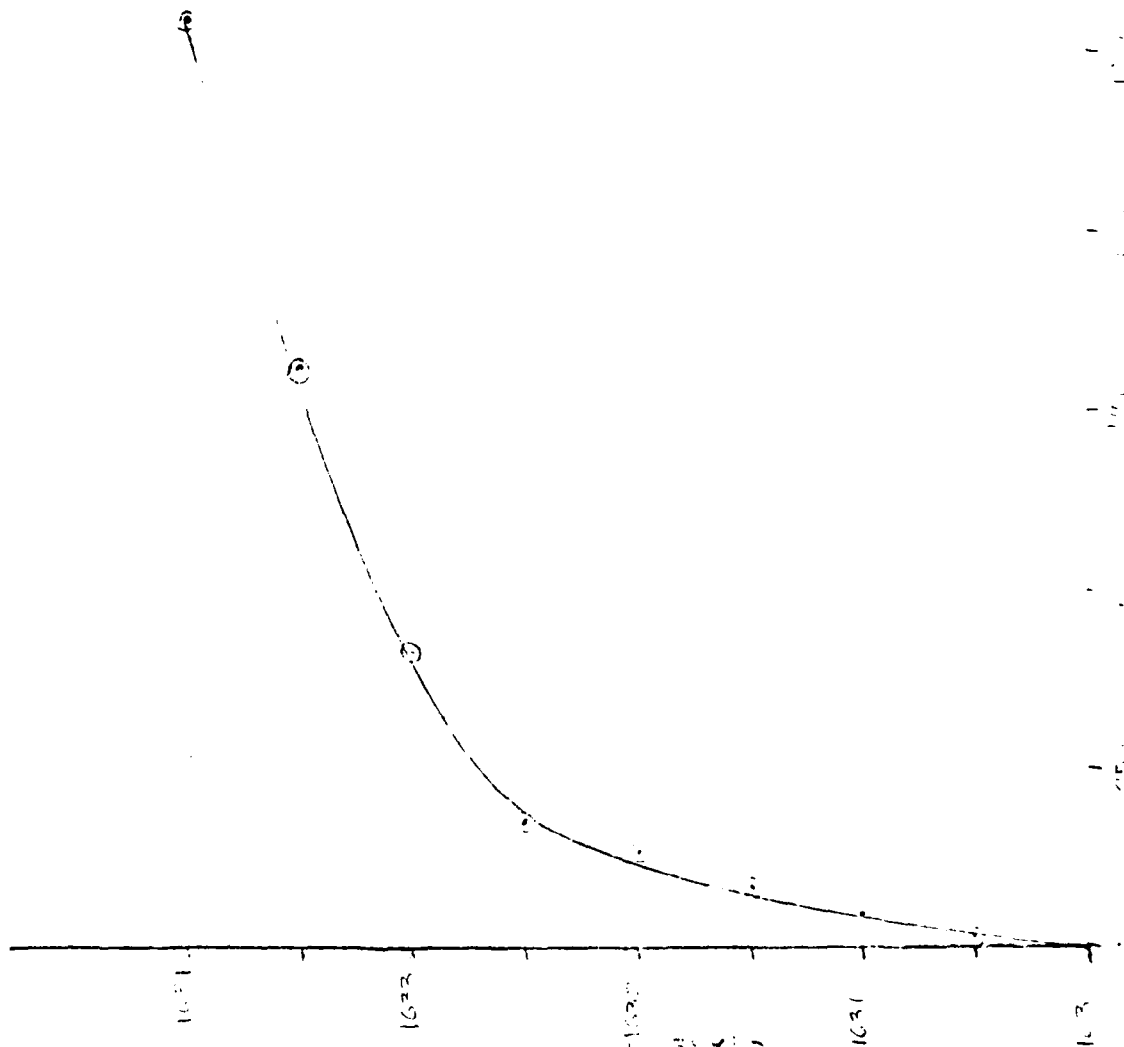
<u>STAGE</u>	<u>$Q = 3(15)H^{1.5}$</u>	<u>$Q = 2.5(200)H^{1.5}$</u>	<u>DISCHARGE</u>
1630.0	—	—	0
1630.5	$3(15)(.5)^{1.5}$	—	15.9
1631.0	$3(15)(1)^{1.5}$	—	45.0
1631.5	$3(15)(1.5)^{1.5}$	—	82.7
1632.0	$3(15)(2)^{1.5}$	—	157.3
1632.5	$3(15)(2.5)^{1.5}$	—	277.9
1633.0	$3(15)(3)^{1.5}$	$2.5(207)(.5)^{1.5}$	416.8
1633.5	$3(15)(3.5)^{1.5}$	$2.5(207)(1)^{1.5}$	812.2
1634.0	$3(15)(4)^{1.5}$	$2.5(207)(1.5)^{1.5}$	1310.7

PROJECT _____



FLAHERTY-GIAVARA ASSOCIATES
 ENVIRONMENTAL DESIGN CONSULTANTS
 ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203-789-1200

SHEET NO. _____ OF _____
 BY _____ DATE _____
 CHK'D. BY _____ DATE _____



Discard

PROJECT South



FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA NEW HAVEN CONN 06510/203/789-1280

SHEET NO. _____ OF _____
BY _____ DATE _____
CHK'D. BY TLW DATE 2-1-88

SPRINKLER SYSTEMS CHART

1. 1st Floor
2. 2nd Floor
3. 3rd Floor
4. 4th Floor
5. 5th Floor
6. 6th Floor
7. 7th Floor
8. 8th Floor
9. 9th Floor
10. 10th Floor
11. 11th Floor
12. 12th Floor
13. 13th Floor
14. 14th Floor
15. 15th Floor
16. 16th Floor
17. 17th Floor
18. 18th Floor
19. 19th Floor
20. 20th Floor
21. 21st Floor
22. 22nd Floor
23. 23rd Floor
24. 24th Floor
25. 25th Floor
26. 26th Floor
27. 27th Floor
28. 28th Floor
29. 29th Floor
30. 30th Floor
31. 31st Floor
32. 32nd Floor
33. 33rd Floor
34. 34th Floor
35. 35th Floor
36. 36th Floor
37. 37th Floor
38. 38th Floor
39. 39th Floor
40. 40th Floor
41. 41st Floor
42. 42nd Floor
43. 43rd Floor
44. 44th Floor
45. 45th Floor
46. 46th Floor
47. 47th Floor
48. 48th Floor
49. 49th Floor
50. 50th Floor
51. 51st Floor
52. 52nd Floor
53. 53rd Floor
54. 54th Floor
55. 55th Floor
56. 56th Floor
57. 57th Floor
58. 58th Floor
59. 59th Floor
60. 60th Floor
61. 61st Floor
62. 62nd Floor
63. 63rd Floor
64. 64th Floor
65. 65th Floor
66. 66th Floor
67. 67th Floor
68. 68th Floor
69. 69th Floor
70. 70th Floor
71. 71st Floor
72. 72nd Floor
73. 73rd Floor
74. 74th Floor
75. 75th Floor
76. 76th Floor
77. 77th Floor
78. 78th Floor
79. 79th Floor
80. 80th Floor
81. 81st Floor
82. 82nd Floor
83. 83rd Floor
84. 84th Floor
85. 85th Floor
86. 86th Floor
87. 87th Floor
88. 88th Floor
89. 89th Floor
90. 90th Floor
91. 91st Floor
92. 92nd Floor
93. 93rd Floor
94. 94th Floor
95. 95th Floor
96. 96th Floor
97. 97th Floor
98. 98th Floor
99. 99th Floor
100. 100th Floor
101. 101st Floor
102. 102nd Floor
103. 103rd Floor
104. 104th Floor
105. 105th Floor
106. 106th Floor
107. 107th Floor
108. 108th Floor
109. 109th Floor
110. 110th Floor
111. 111st Floor
112. 112nd Floor
113. 113rd Floor
114. 114th Floor
115. 115th Floor
116. 116th Floor
117. 117th Floor
118. 118th Floor
119. 119th Floor
120. 120th Floor
121. 121st Floor
122. 122nd Floor
123. 123rd Floor
124. 124th Floor
125. 125th Floor
126. 126th Floor
127. 127th Floor
128. 128th Floor
129. 129th Floor
130. 130th Floor
131. 131st Floor
132. 132nd Floor
133. 133rd Floor
134. 134th Floor
135. 135th Floor
136. 136th Floor
137. 137th Floor
138. 138th Floor
139. 139th Floor
140. 140th Floor
141. 141st Floor
142. 142nd Floor
143. 143rd Floor
144. 144th Floor
145. 145th Floor
146. 146th Floor
147. 147th Floor
148. 148th Floor
149. 149th Floor
150. 150th Floor
151. 151st Floor
152. 152nd Floor
153. 153rd Floor
154. 154th Floor
155. 155th Floor
156. 156th Floor
157. 157th Floor
158. 158th Floor
159. 159th Floor
160. 160th Floor
161. 161st Floor
162. 162nd Floor
163. 163rd Floor
164. 164th Floor
165. 165th Floor
166. 166th Floor
167. 167th Floor
168. 168th Floor
169. 169th Floor
170. 170th Floor
171. 171st Floor
172. 172nd Floor
173. 173rd Floor
174. 174th Floor
175. 175th Floor
176. 176th Floor
177. 177th Floor
178. 178th Floor
179. 179th Floor
180. 180th Floor
181. 181st Floor
182. 182nd Floor
183. 183rd Floor
184. 184th Floor
185. 185th Floor
186. 186th Floor
187. 187th Floor
188. 188th Floor
189. 189th Floor
190. 190th Floor
191. 191st Floor
192. 192nd Floor
193. 193rd Floor
194. 194th Floor
195. 195th Floor
196. 196th Floor
197. 197th Floor
198. 198th Floor
199. 199th Floor
200. 200th Floor
201. 201st Floor
202. 202nd Floor
203. 203rd Floor
204. 204th Floor
205. 205th Floor
206. 206th Floor
207. 207th Floor
208. 208th Floor
209. 209th Floor
210. 210th Floor
211. 211st Floor
212. 212nd Floor
213. 213rd Floor
214. 214th Floor
215. 215th Floor
216. 216th Floor
217. 217th Floor
218. 218th Floor
219. 219th Floor
220. 220th Floor
221. 221st Floor
222. 222nd Floor
223. 223rd Floor
224. 224th Floor
225. 225th Floor
226. 226th Floor
227. 227th Floor
228. 228th Floor
229. 229th Floor
230. 230th Floor
231. 231st Floor
232. 232nd Floor
233. 233rd Floor
234. 234th Floor
235. 235th Floor
236. 236th Floor
237. 237th Floor
238. 238th Floor
239. 239th Floor
240. 240th Floor
241. 241st Floor
242. 242nd Floor
243. 243rd Floor
244. 244th Floor
245. 245th Floor
246. 246th Floor
247. 247th Floor
248. 248th Floor
249. 249th Floor
250. 250th Floor
251. 251st Floor
252. 252nd Floor
253. 253rd Floor
254. 254th Floor
255. 255th Floor
256. 256th Floor
257. 257th Floor
258. 258th Floor
259. 259th Floor
260. 260th Floor
261. 261st Floor
262. 262nd Floor
263. 263rd Floor
264. 264th Floor
265. 265th Floor
266. 266th Floor
267. 267th Floor
268. 268th Floor
269. 269th Floor
270. 270th Floor
271. 271st Floor
272. 272nd Floor
273. 273rd Floor
274. 274th Floor
275. 275th Floor
276. 276th Floor
277. 277th Floor
278. 278th Floor
279. 279th Floor
280. 280th Floor
281. 281st Floor
282. 282nd Floor
283. 283rd Floor
284. 284th Floor
285. 285th Floor
286. 286th Floor
287. 287th Floor
288. 288th Floor
289. 289th Floor
290. 290th Floor
291. 291st Floor
292. 292nd Floor
293. 293rd Floor
294. 294th Floor
295. 295th Floor
296. 296th Floor
297. 297th Floor
298. 298th Floor
299. 299th Floor
300. 300th Floor
301. 301st Floor
302. 302nd Floor
303. 303rd Floor
304. 304th Floor
305. 305th Floor
306. 306th Floor
307. 307th Floor
308. 308th Floor
309. 309th Floor
310. 310th Floor
311. 311st Floor
312. 312nd Floor
313. 313rd Floor
314. 314th Floor
315. 315th Floor
316. 316th Floor
317. 317th Floor
318. 318th Floor
319. 319th Floor
320. 320th Floor
321. 321st Floor
322. 322nd Floor
323. 323rd Floor
324. 324th Floor
325. 325th Floor
326. 326th Floor
327. 327th Floor
328. 328th Floor
329. 329th Floor
330. 330th Floor
331. 331st Floor
332. 332nd Floor
333. 333rd Floor
334. 334th Floor
335. 335th Floor
336. 336th Floor
337. 337th Floor
338. 338th Floor
339. 339th Floor
340. 340th Floor
341. 341st Floor
342. 342nd Floor
343. 343rd Floor
344. 344th Floor
345. 345th Floor
346. 346th Floor
347. 347th Floor
348. 348th Floor
349. 349th Floor
350. 350th Floor
351. 351st Floor
352. 352nd Floor
353. 353rd Floor
354. 354th Floor
355. 355th Floor
356. 356th Floor
357. 357th Floor
358. 358th Floor
359. 359th Floor
360. 360th Floor
361. 361st Floor
362. 362nd Floor
363. 363rd Floor
364. 364th Floor
365. 365th Floor
366. 366th Floor
367. 367th Floor
368. 368th Floor
369. 369th Floor
370. 370th Floor
371. 371st Floor
372. 372nd Floor
373. 373rd Floor
374. 374th Floor
375. 375th Floor
376. 376th Floor
377. 377th Floor
378. 378th Floor
379. 379th Floor
380. 380th Floor
381. 381st Floor
382. 382nd Floor
383. 383rd Floor
384. 384th Floor
385. 385th Floor
386. 386th Floor
387. 387th Floor
388. 388th Floor
389. 389th Floor
390. 390th Floor
391. 391st Floor
392. 392nd Floor
393. 393rd Floor
394. 394th Floor
395. 395th Floor
396. 396th Floor
397. 397th Floor
398. 398th Floor
399. 399th Floor
400. 400th Floor
401. 401st Floor
402. 402nd Floor
403. 403rd Floor
404. 404th Floor
405. 405th Floor
406. 406th Floor
407. 407th Floor
408. 408th Floor
409. 409th Floor
410. 410th Floor
411. 411st Floor
412. 412nd Floor
413. 413rd Floor
414. 414th Floor
415. 415th Floor
416. 416th Floor
417. 417th Floor
418. 418th Floor
419. 419th Floor
420. 420th Floor
421. 421st Floor
422. 422nd Floor
423. 423rd Floor
424. 424th Floor
425. 425th Floor
426. 426th Floor
427. 427th Floor
428. 428th Floor
429. 429th Floor
430. 430th Floor
431. 431st Floor
432. 432nd Floor
433. 433rd Floor
434. 434th Floor
435. 435th Floor
436. 436th Floor
437. 437th Floor
438. 438th Floor
439. 439th Floor
440. 440th Floor
441. 441st Floor
442. 442nd Floor
443. 443rd Floor
444. 444th Floor
445. 445th Floor
446. 446th Floor
447. 447th Floor
448. 448th Floor
449. 449th Floor
450. 450th Floor
451. 451st Floor
452. 452nd Floor
453. 453rd Floor
454. 454th Floor
455. 455th Floor
456. 456th Floor
457. 457th Floor
458. 458th Floor
459. 459th Floor
460. 460th Floor
461. 461st Floor
462. 462nd Floor
463. 463rd Floor
464. 464th Floor
465. 465th Floor
466. 466th Floor
467. 467th Floor
468. 468th Floor
469. 469th Floor
470. 470th Floor
471. 471st Floor
472. 472nd Floor
473. 473rd Floor
474. 474th Floor
475. 475th Floor
476. 476th Floor
477. 477th Floor
478. 478th Floor
479. 479th Floor
480. 480th Floor
481. 481st Floor
482. 482nd Floor
483. 483rd Floor
484. 484th Floor
485. 485th Floor
486. 486th Floor
487. 487th Floor
488. 488th Floor
489. 489th Floor
490. 490th Floor
491. 491st Floor
492. 492nd Floor
493. 493rd Floor
494. 494th Floor
495. 495th Floor
496. 496th Floor
497. 497th Floor
498. 498th Floor
499. 499th Floor
500. 500th Floor
501. 501st Floor
502. 502nd Floor
503. 503rd Floor
504. 504th Floor
505. 505th Floor
506. 506th Floor
507. 507th Floor
508. 508th Floor
509. 509th Floor
510. 510th Floor
511. 511st Floor
512. 512nd Floor
513. 513rd Floor
514. 514th Floor
515. 515th Floor
516. 516th Floor
517. 517th Floor
518. 518th Floor
519. 519th Floor
520. 520th Floor
521. 521st Floor
522. 522nd Floor
523. 523rd Floor
524. 524th Floor
525. 525th Floor
526. 526th Floor
527. 527th Floor
528. 528th Floor
529. 529th Floor
530. 530th Floor
531. 531st Floor
532. 532nd Floor
533. 533rd Floor
534. 534th Floor
535. 535th Floor
536. 536th Floor
537. 537th Floor
538. 538th Floor
539. 539th Floor
540. 540th Floor
541. 541st Floor
542. 542nd Floor
543. 543rd Floor
544. 544th Floor
545. 545th Floor
546. 546th Floor
547. 547th Floor
548. 548th Floor
549. 549th Floor
550. 550th Floor
551. 551st Floor
552. 552nd Floor
553. 553rd Floor
554. 554th Floor
555. 555th Floor
556. 556th Floor
557. 557th Floor
558. 558th Floor
559. 559th Floor
560. 560th Floor
561. 561st Floor
562. 562nd Floor
563. 563rd Floor
564. 564th Floor
565. 565th Floor
566. 566th Floor
567. 567th Floor
568. 568th Floor
569. 569th Floor
570. 570th Floor
571. 571st Floor
572. 572nd Floor
573. 573rd Floor
574. 574th Floor
575. 575th Floor
576. 576th Floor
577. 577th Floor
578. 578th Floor
579. 579th Floor
580. 580th Floor
581. 581st Floor
582. 582nd Floor
583. 583rd Floor
584. 584th Floor
585. 585th Floor
586. 586th Floor
587. 587th Floor
588. 588th Floor
589. 589th Floor
590. 590th Floor
591. 591st Floor
592. 592nd Floor
593. 593rd Floor
594. 594th Floor
595. 595th Floor
596. 596th Floor
597. 597th Floor
598. 598th Floor
599. 599th Floor
600. 600th Floor
601. 601st Floor
602. 602nd Floor
603. 603rd Floor
604. 604th Floor
605. 605th Floor
606. 606th Floor
607. 607th Floor
608. 608th Floor
609. 609th Floor
610. 610th Floor
611. 611st Floor
612. 612nd Floor
613. 613rd Floor
614. 614th Floor
615. 615th Floor
616. 616th Floor
617. 617th Floor
618. 618th Floor
619. 619th Floor
620. 620th Floor
621. 621st Floor
622. 622nd Floor
623. 623rd Floor
624. 624th Floor
625. 625th Floor
626. 626th Floor
627. 627th Floor
628. 628th Floor
629. 629th Floor
630. 630th Floor
631. 631st Floor
632. 632nd Floor
633. 633rd Floor
634. 634th Floor
635. 635th Floor
636. 636th Floor
637. 637th Floor
638. 638th Floor
639. 639th Floor
640. 640th Floor
641. 641st Floor
642. 642nd Floor
643. 643rd Floor
644. 644th Floor
645. 645th Floor
646. 646th Floor
647. 647th Floor
648. 648th Floor
649. 649th Floor
650. 650th Floor
651. 651st Floor
652. 652nd Floor
653. 653rd Floor
654. 654th Floor
655. 655th Floor
656. 656th Floor
657. 657th Floor
658. 658th Floor
659. 659th Floor
660. 660th Floor
661. 661st Floor
662. 662nd Floor
663. 663rd Floor
664. 664th Floor
665. 665th Floor
666. 666th Floor
667. 667th Floor
668. 668th Floor
669. 669th Floor
670. 670th Floor
671. 671st Floor
672. 672nd Floor
673. 673rd Floor
674. 674th Floor
675. 675th Floor
676. 676th Floor
677. 677th Floor
678. 678th Floor
679. 679th Floor
680. 680th Floor
681. 681st Floor
682. 682nd Floor
683. 683rd Floor
684. 684th Floor
685. 685th Floor
686. 686th Floor
687. 687th Floor
688. 688th Floor
689. 689th Floor
690. 690th Floor
691. 691st Floor
692. 692nd Floor
693. 693rd Floor
694. 694th Floor
695. 695th Floor
696. 696th Floor
697. 697th Floor
698. 698th Floor
699. 699th Floor
700. 700th Floor
701. 701st Floor
702. 702nd Floor
703. 703rd Floor
704. 704th Floor
705. 705th Floor
706. 706th Floor
707. 707th Floor
708. 708th Floor
709. 709th Floor
710. 710th Floor
711. 711st Floor
712. 712nd Floor
713. 713rd Floor
714. 714th Floor
715. 715th Floor
716. 716th Floor
717. 717th Floor
718. 718th Floor
719. 719th Floor
720. 720th Floor
721. 721st Floor
722. 722nd Floor
723. 723rd Floor
724. 724th Floor
725. 725th Floor
726. 726th Floor
727. 727th Floor
728. 728th Floor
729. 729th Floor
730. 730th Floor
731. 731st Floor
732. 732nd Floor
733. 733rd Floor
734. 734th Floor
735. 735th Floor
736. 736th Floor
737. 737th Floor
738. 738th Floor
739. 739th Floor
740. 740th Floor
741. 741st Floor
742. 742nd Floor
743. 743rd Floor
744. 744th Floor
745. 745th Floor
746. 746th Floor
747. 747th Floor
748. 748th Floor
749. 749th Floor
750. 750th Floor
751. 751st Floor
752. 752nd Floor
753. 753rd Floor
754. 754th Floor
755. 755th Floor
756. 756th Floor
757. 757th Floor
758. 758th Floor
759. 759th Floor
760. 760th Floor
761. 761st Floor
762. 762nd Floor
763. 763rd Floor
764. 764th Floor
765. 765th Floor
766. 766th Floor
767. 767th Floor
768. 768th Floor
769. 769th Floor
770. 770th Floor
771. 771st Floor
772. 772nd Floor
773. 773rd Floor
774. 774th Floor
775. 775th Floor
776. 776th Floor
777. 777th Floor
778. 778th Floor
779. 779th Floor
780. 780th Floor
781. 781st Floor
782. 782nd Floor
783. 783rd Floor
784. 784th Floor
785. 785th Floor
786. 786th Floor
787. 787th Floor
788. 788th Floor
789. 789th Floor
790. 790th Floor
791. 791st Floor
792. 792nd Floor
793. 793rd Floor
794. 794th Floor
795. 795th Floor
796. 796th Floor
797. 797th Floor
798. 798th Floor
799. 799th Floor
800. 800th Floor
801. 801st Floor
802. 802nd Floor
803. 803rd Floor
804. 804th Floor
805. 805th Floor
806. 806th Floor
807. 807th Floor
808. 808th Floor
809. 809th Floor
810. 810th Floor
811. 811st Floor
812. 812nd Floor
813. 813rd Floor
814. 814th Floor
815. 815th Floor
816. 816th Floor
817. 817th Floor
818. 818th Floor
819. 819th Floor
820. 820th Floor
821. 821st Floor
822. 822nd Floor
823. 823rd Floor
824. 824th Floor
825. 825th Floor
826. 826th Floor
827. 827th Floor
828. 828th Floor
829. 829th Floor
830. 830th Floor
831. 831st Floor
832. 832nd Floor
833. 833rd Floor
834. 834th Floor
835. 835th Floor
836. 836th Floor
837. 837th Floor
838. 838th Floor
839. 839th Floor
840. 840th Floor
841. 841st Floor
842. 842nd Floor
843. 843rd Floor
844. 844th Floor
845. 845th Floor
846. 846th Floor
847. 847th Floor
848. 848th Floor
849. 849th Floor
850. 850th Floor
851. 851st Floor
852. 852nd Floor
853. 853rd Floor
854. 854th Floor
855. 855th Floor
856. 856th Floor
857. 857th Floor
858. 858th Floor
859. 859th Floor
860. 860th Floor
861. 861st Floor
862. 862nd Floor
863. 863rd Floor
864. 864th Floor
865. 865th Floor
866. 866th Floor
867. 867th Floor
868. 868th Floor
869. 869th Floor
870. 870th Floor
871. 871st Floor
872. 872nd Floor
873. 873rd Floor
874. 874th Floor
875. 875th Floor
876. 876th Floor
877. 877th Floor
878. 878th Floor
879. 879th Floor
880. 880th Floor
881. 881st Floor
882. 882nd Floor
883. 883rd Floor
884. 884th Floor
885. 885th Floor
886. 886th Floor
887. 887th Floor
888. 888th Floor
889. 889th Floor
890. 890th Floor
891. 891st Floor
892. 892nd Floor
893. 893rd Floor
894. 894th Floor
895. 895th Floor
896. 896th Floor
897. 897th Floor
898. 898th Floor
899. 899th Floor
900. 900th Floor
901. 901st Floor
902. 902nd Floor
903. 903rd Floor
904. 904th Floor
905. 905th Floor
906. 906th Floor
907. 907th Floor
908. 908th Floor
909. 909th Floor
910. 910th Floor
911. 911st Floor
912. 912nd Floor
913. 913rd Floor
914. 914th Floor
915. 915th Floor
916. 916th Floor
917. 917th Floor
918. 918th Floor
919. 919th Floor
920. 920th Floor
921. 921st Floor
922. 922nd Floor
923. 923rd Floor
924. 924th Floor
925. 925th Floor
926. 926th Floor
927. 927th Floor
928. 928th Floor
929. 929th Floor
930. 930th Floor
931. 931st Floor
932. 932nd Floor
933. 933rd Floor
934. 934th Floor
935. 935th Floor
936. 936th Floor
937. 937th Floor
938. 938th Floor
939. 939th Floor
940. 940th Floor
941. 941st Floor
942. 942nd Floor
943. 943rd Floor
944. 944th Floor
945. 945th Floor
946. 946th Floor
947. 947th Floor
948. 948th Floor
949. 949th Floor
950. 950th Floor
951. 951st Floor
952. 952nd Floor
953. 953rd Floor
954. 954th Floor
955. 955th Floor
956. 956th Floor
957. 957th Floor
958. 958th Floor
959. 959th Floor
960. 960th Floor
961. 961st Floor
962. 962nd Floor
963. 963rd Floor
964. 964th Floor
965. 965th Floor
966. 966th Floor
967. 967th Floor
968. 968th Floor
969. 969th Floor
970. 970th Floor
971. 971st Floor
972. 972nd Floor
973. 973rd Floor
974. 974th Floor
975. 975th Floor
976. 976th Floor
977. 977th Floor
978. 978th Floor
979. 979th Floor
980. 980th Floor
981. 981st Floor
982. 982nd Floor
983. 983rd Floor
984. 984th Floor
985. 985th Floor
986. 986th Floor
987. 987th Floor
988. 988th Floor
989. 989th Floor
990. 990th Floor
991. 991st Floor
992. 992nd Floor
993. 993rd Floor
994. 994th Floor
995. 995th Floor
996. 996th Floor
997. 997th Floor
998. 998th Floor
999. 999th Floor
1000. 1000th Floor
1001. 1001st Floor
1002. 1002nd Floor
1003. 1003rd Floor
1004. 1004th Floor
1005. 1005th Floor
1006. 1006th Floor
1007. 1007th Floor
1008. 1008th Floor
1009. 1009th Floor
1010. 1010th Floor
1011. 1011st Floor
1012. 1012nd Floor
1013. 1013rd Floor
1014. 1014th Floor
1015. 1015th Floor
1016. 1016th Floor
1017. 1017th Floor
1018. 1018th Floor
1019. 1019th Floor
1020.

HEC-1 FLOOD HYDROGRAPH COMPUTATIONS

FLAHERTY GIAVARA ASSOCIATES, P. C.

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

A1 NATIONAL DAM INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
A2 DAM INVENTORY NO 1269, MOE POND DAM, OTSEGO COUNTY, NEW YORK, APRIL 29, 1981
A3 PREPARED BY FLAMETRY GAVARA ASSOCIATES, P.C., ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT
120 0 30 0 0 0 2 0 0

[illegible][illegible][illegible][illegible]

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
RUNOFF HYDROGRAPH AT
RORLIE HYDROGRAPH TO

PAGE 130-1

END OF NETWORK

JULY 1978
26 FEB 79

RUN DATE: 9/02/
 TIME: 11:43 AM

NATIONAL INSPECTION PROGRAM, PHASE I REPORT, CORPS OF ENGINEERS - NEW YORK DISTRICT
DAM INVENTORY NO. 1269, MOE POND DAM, OTSEGO COUNTY, NEW YORK, APRIL 29, 1981
PREPARED BY FLAHERTY GIARRA ASSOCIATES, P. C. ONE COLUMBUS PLAZA, NEW HAVEN, CONNECTICUT

JOB SPECIFICATION									
NG	NHR	NMIN	IDAY	IHR	IRIN	METRC	IPLT	IPRT	NSTAN
120	0	30	0	0	0	0	2	0	0
			JOPER	NWT	LROPT	TRACE			
			9	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED

RTIUS=	0.50	0.33	0.60	0.61	0.62	0.63	0.64	0.65	1.00
NPLAN= 1 NRTIO= 9 LRTO= 1									

◆◆◆◆◆

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH	- SNYDER	METHOD	ITAPE	JPLT	JPRF	INAME	ISTAGE	IAUTO
ISTAG	ICOMP	IECON						
1	0	0	0	0	0	1	0	0

HYDRO	IUN9	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISANE	LOCAL
1	1	0.26	0.00	0.26	0.00	0.000	0	1	0

PRECIP DATA

TRSPC COMPUTED BY THE PROGRAM IS 0.500

LOSS DATA										
LRPOT	STRKR	DLTKR	RTIOL	ERAIN	STBKS	RTIOK	STRTL	CNSTL	ALSHK	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.45 CP=0.63 NTA= 0

RECESSION DATA

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP	STRTO=-2.00	GRCSN=-0.10	RTIOR=1.90
AND TP ARE TC=3.97			AND R=2.28
			INTERVALS

UNIT HYDROGRAPH 14 END-OF-PERIOD ORDINATES; LAQ= 1.44 HOURS, CP= 0.63 VOL= 1.00

[illegible]

• 2017 •

PAGE 0004

FLAHERTY GIAVARA ASSOCIATES, P. C.

PRECIP(L) AND EXCESS(X)		0		2		4		6		8		10		12		14		16		18		20		22		24		26		28		30		32		34		36		38		40		42		44		46		48		50		52		54		56		58		60		62		64		66		68		70		72		74		76		78		80		82		84		86		88		90		92		94		96		98		100		102		104		106		108		110		112		114		116		118		120		122		124		126		128		130		132		134		136		138		140		142		144		146		148		150		152		154		156		158		160		162		164		166		168		170		172		174		176		178		180		182		184		186		188		190		192		194		196		198		200		202		204		206		208		210		212		214		216		218		220		222		224		226		228		230		232		234		236		238		240		242		244		246		248		250		252		254		256		258		260		262		264		266		268		270		272		274		276		278		280		282		284		286		288		290		292		294		296		298		300		302		304		306		308		310		312		314		316		318		320		322		324		326		328		330		332		334		336		338		340		342		344		346		348		350		352		354		356		358		360		362		364		366		368		370		372		374		376		378		380		382		384		386		388		390		392		394		396		398		400		402		404		406		408		410		412		414		416		418		420		422		424		426		428		430		432		434		436		438		440		442		444		446		448		450		452		454		456		458		460		462		464		466		468		470		472		474		476		478		480		482		484		486		488		490		492		494		496		498		500		502		504		506		508		510		512		514		516		518		520		522		524		526		528		530		532		534		536		538		540		542		544		546		548		550		552		554		556		558		560		562		564		566		568		570		572		574		576		578		580		582		584		586		588		590		592		594		596		598		600		602		604		606		608		610		612		614		616		618		620		622		624		626		628		630		632		634		636		638		640		642		644		646		648		650		652		654		656		658		660		662		664		666		668		670		672		674		676		678		680		682		684		686		688		690		692		694		696		698		700		702		704		706		708		710		712		714		716		718		720		722		724		726		728		730		732		734		736		738		740		742		744		746		748		750		752		754		756		758		760		762		764		766		768		770		772		774		776		778		780		782		784		786		788		790		792		794		796		798		800		802		804		806		808		810		812		814		816		818		820		822		824		826		828		830		832		834		836		838		840		842		844		846		848		850		852		854		856		858		860		862		864		866		868		870		872		874		876		878		880		882		884		886		888		890		892		894		896		898		900		902		904		906		908		910		912		914		916		918		920		922		924		926		928		930		932		934		936		938		940		942		944
-------------------------	--	---	--	---	--	---	--	---	--	---	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----	--	-----

9. 30115.
10. 00116.
10. 30117.
11. 00118.
11. 30119.
12. 00120.

END

[illegible][illegible]

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

[illegible][illegible]

HYDROGRAPH AT STA
1 FOR PLAN 1, RTIO 9

[illegible]

[illegible]

DAM DATA			
TOPEL	COORD	EXPD	DAMWID
1632.5	2.5	1.5	207.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

1630 189397
1630
1631
1631
1630
1630

1630 170397
1630
1632
1631
1630
1630

1630 15 1 4 0 7
1630
1632
1631
1631
1630

1630 141407
1630
1632
1631
1631
1630

1630.	1
1630.	3
1632.	1
1631.	5
1631.	0
1630.	8

1630. 1205. 18
1630. 1205. 18
1632. 1205. 18
1631. 1205. 18
1631. 1205. 18
1630. 1205. 18

1630. 0.28.6.1.8

1630. 02.67.18
1630.
1631.
1631.
1631.
1630.

1630.	0
1630.	1
1631.	3
1631.	7
1631.	2
1630.	9

1630.	0
1630.	1
1631.	1
1631.	8
1631.	2
1630.	9

PEAK OUTFLOW IS 135. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFB	135.	114.	60.	24.	1.	83.
CMS	4.	13.	2.	1.	1.	9.69
INCHES		4.10	8.54	8.69		220.79
MM		104.04	216.80	220.79		120.
CU-FT		118.	118.	149.		149.
THOUS. CU M		37.	146.	149.		149.
		70.				

OVF

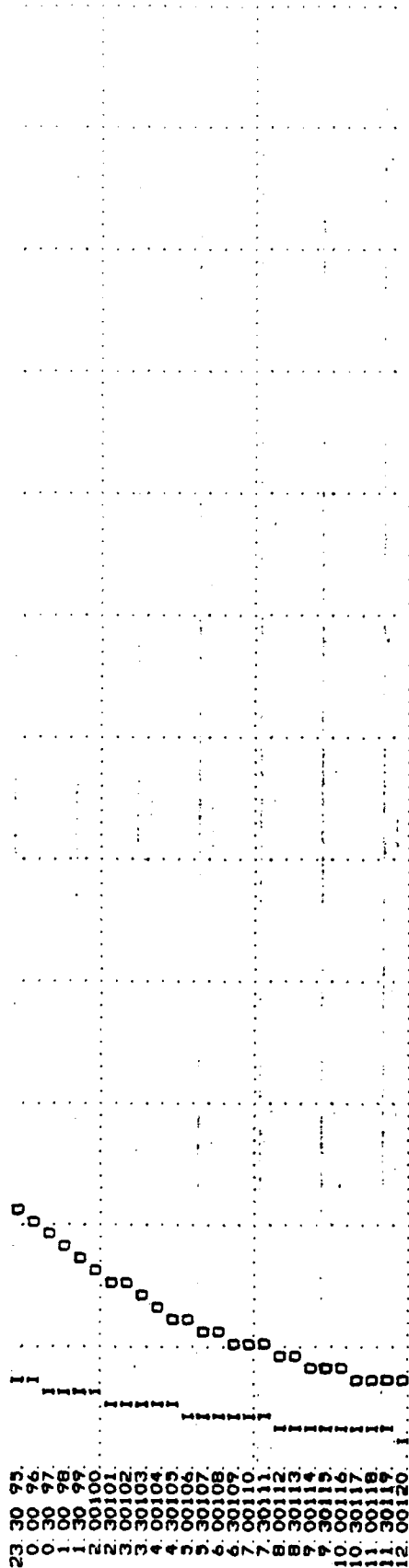
STATION 1

	INFLOW(I),	OUTFLOW(O)	AND OBSERVED FLOW(*)	
0	40	80	120	160
			200	240
			280	320
			360	0
			0	0

C-21

FLAHERTY GIAVARA ASSOCIATES, P. C.

C-22



◆ ◆ ◆ ◆ ◆

STATION 1, PLAN 1, RATIO 2
END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 153. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFB	153.	129.	66.	27.	1.	92.
CMS	4.	4.	2.	1.	1.	7.65
INCHES		4.60	9.48	7.65		245.18
MM		116.89	240.69	245.18		134.
AC-FT		64.	131.	134.		165
THOUS CU M		79.	162.	165.		

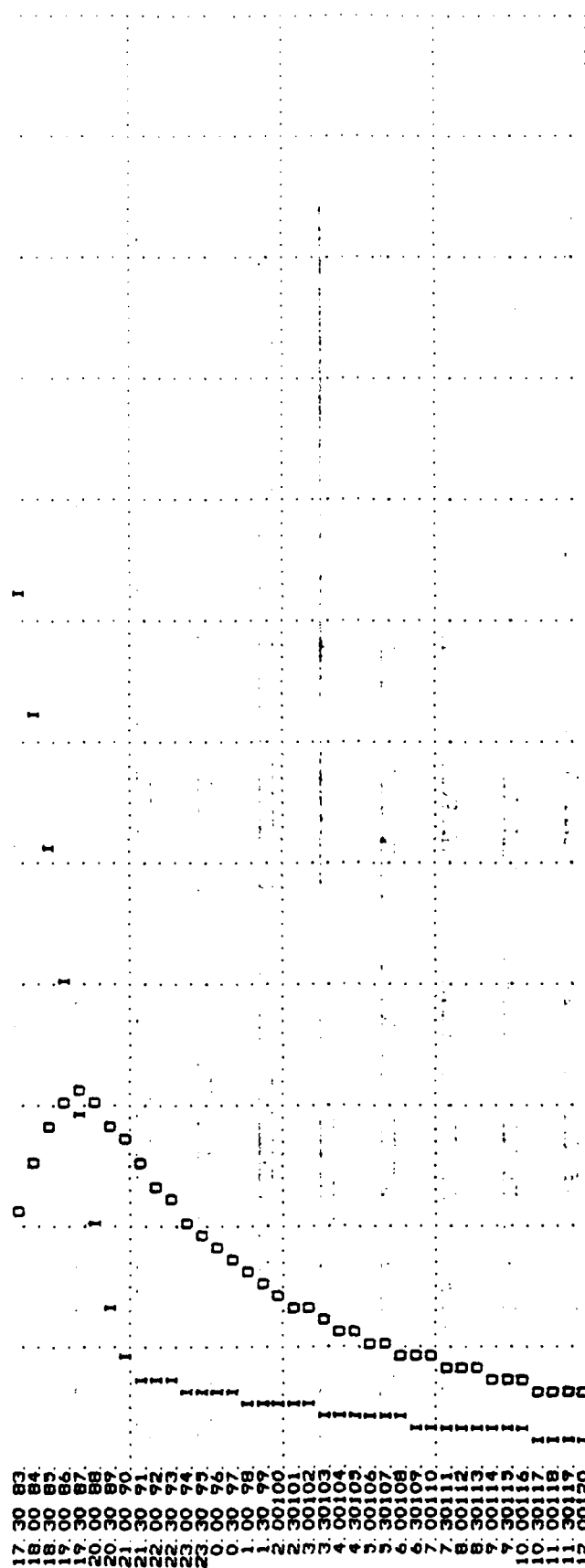
STATION 1

INFLOW(I),	OUTFLOW(Q)	AND OBSERVED FLOW(*)
0	50	300
100	150	250
200	200	200
300	250	150
400	300	100
500	350	50

[illegible]

FLAHERTY CIAVARA ASSOCIATES, P. C.

12 00 291
13 00 261
14 00 281
15 00 291
16 00 311
17 00 321
18 00 3301
19 00 3401
20 00 3501
21 00 3601
22 00 3701
23 00 3801
24 00 3901
25 00 401
26 00 411
27 00 421
28 00 431
29 00 441
30 00 451
31 00 461
32 00 471
33 00 481
34 00 491
35 00 501
36 00 511
37 00 521
38 00 531
39 00 541
40 00 551
41 00 561
42 00 571
43 00 581
44 00 591
45 00 601
46 00 611
47 00 6201
48 00 6301
49 00 6401
50 00 6501
51 00 6601
52 00 6701
53 00 6801
54 00 6901
55 00 7001
56 00 7101
57 00 7201
58 00 7301
59 00 7401
60 00 7501
61 00 7601
62 00 7701
63 00 7801
64 00 7901
65 00 8001
66 00 8101
67 00 8201



◆◆◆

STATION 1, PLAN 1, RATIO 3
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

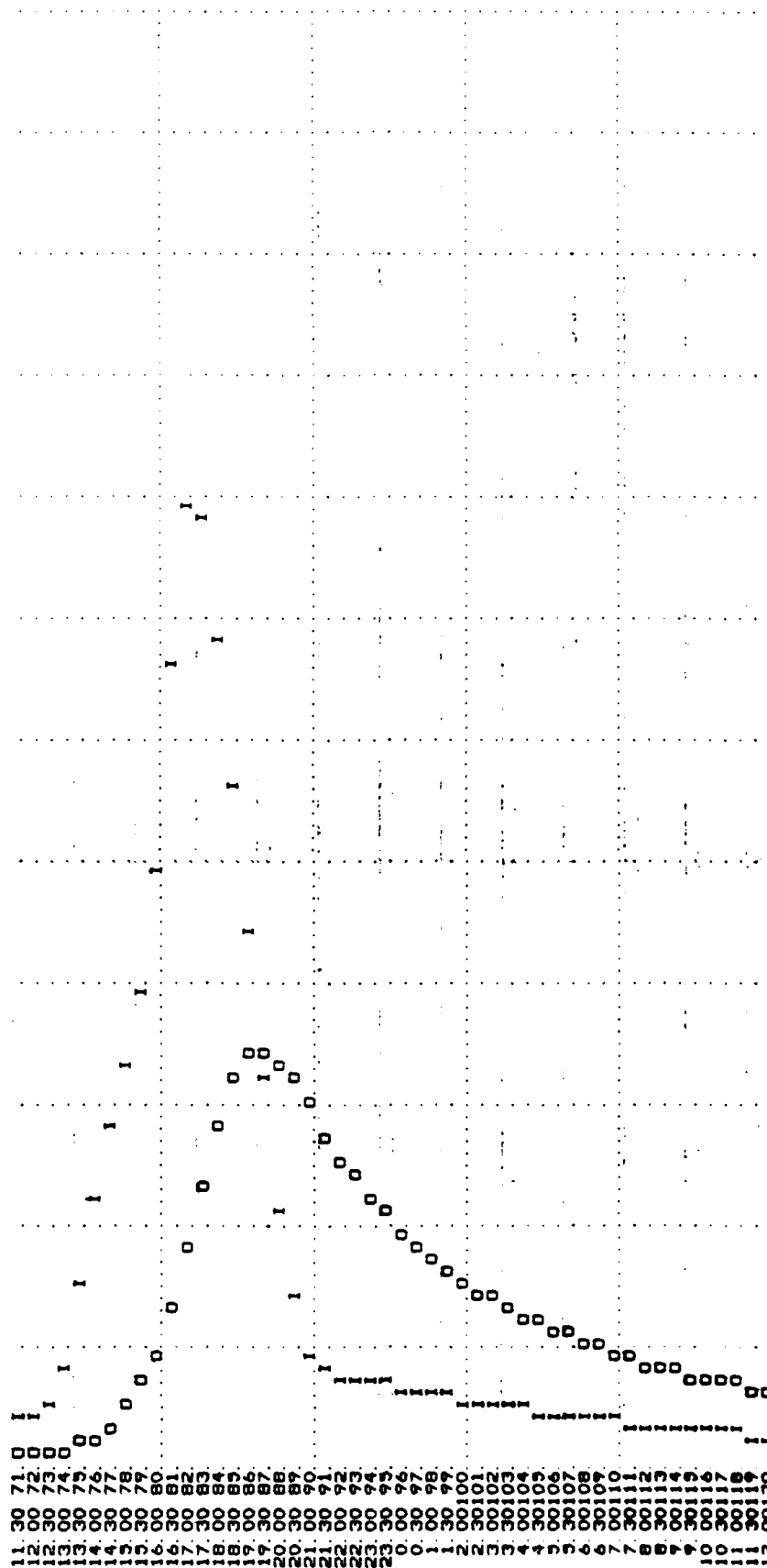
[illegible]

PEAK OUTFLOW IS 170. AT TIME 43.50 HOURS

♦QVF♦

STATION	1
INFLW(1);	OUTFLOW(1) AND OBSERVED FLOW(1)
50.	100
0.	200
	250
	300

FLAHERTY GIAVARA ASSOCIATES, P. C.



STATION 1, PLAN 1, RATIO 4
END-OF-PERIOD HYDROGRAPH ORDINATES

0000

PEAK OUTFLOW IS 173. AT TIME 43.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	173.	146.	74.	30.		3624.
CBS	5.	4.	2.	1.		103.
INCHES		3.21	10.61	10.81		10.81
MM		132.35	269.42	274.46		274.46
AC-FT		72.	130.	130.		150.
CU M		89.	181.	185.		185.
THOUS						

•DVF•

STATION 1

```

0      . . . INFLOW(I),  OUTFLOW(O) AND OBSERVED FLOW(*)
      . . . 100      150      200      250      300

```

	INFLUENZA	WINTER FLU (*) AND UNOBSERVED FLUM(*)	350	C
50	100	200	400	C
50	100	200	400	:
50	100	200	400	C
50	100	200	400	C

FLAHERTY GIAVARA ASSOCIATES, P. C.

0	0	30	1	1
1	1	30	2	2
2	2	30	3	3
3	3	30	4	4
4	4	30	5	5
5	5	30	6	6
6	6	30	7	7
7	7	30	8	8
8	8	30	9	9
9	9	30	10	10
10	10	30	11	11
11	11	30	12	12
12	12	30	13	13
13	13	30	14	14
14	14	30	15	15
15	15	30	16	16
16	16	30	17	17
17	17	30	18	18
18	18	30	19	19
19	19	30	20	20
20	20	30	21	21
21	21	30	22	22
22	22	30	23	23
23	23	30	24	24
24	24	30	25	25
25	25	30	26	26
26	26	30	27	27
27	27	30	28	28
28	28	30	29	29
29	29	30	30	30
30	30	30	31	31
31	31	30	32	32
32	32	30	33	33
33	33	30	34	34
34	34	30	35	35
35	35	30	36	36
36	36	30	37	37
37	37	30	38	38
38	38	30	39	39
39	39	30	40	40
40	40	30	41	41
41	41	30	42	42
42	42	30	43	43
43	43	30	44	44
44	44	30	45	45
45	45	30	46	46
46	46	30	47	47
47	47	30	48	48
48	48	30	49	49
49	49	30	50	50
50	50	30	51	51
51	51	30	52	52
52	52	30	53	53
53	53	30	54	54
54	54	30	55	55
55	55	30	56	56
56	56	30	57	57
57	57	30	58	58
58	58	30	59	59
59	59	30	60	60

591
30 601
4 30 611
7 30 6201
8 30 6301
9 30 6401
10 30 6501
11 30 6601
12 30 6701
13 30 6801
14 30 6901
15 30 7001
16 30 7101
17 30 7201
18 30 7301
19 30 7401
20 30 7501
21 30 7601
22 30 7701
23 30 7801
24 30 7901
25 30 8001
26 30 8101
27 30 8201
28 30 8301
29 30 8401
30 30 8501
31 30 8601
32 30 8701
33 30 8801
34 30 8901
35 30 9001
36 30 9101
37 30 9201
38 30 9301
39 30 9401
40 30 9501
41 30 9601
42 30 9701
43 30 9801
44 30 9901
45 30 10001
46 30 10101
47 30 10201
48 30 10301
49 30 10401
50 30 10501
51 30 10601
52 30 10701
53 30 10801
54 30 10901
55 30 11001
56 30 11101
57 30 11201
58 30 11301
59 30 11401
60 30 11501

CFS
CMS
INCHES
MM
AC-FT
THOUS CU M

3689.
104.
11.00
279.33
152
188

31.
1.
11.00
279.33
152
188

75.
2.
10.80
274.24
150.
185.

148.
4.
5.31
134.94
74.
91.

177.
5.

OVF

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

0	100	150	200	250	300	350	400	450	0	0	0	0
0.11	0.30	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30
6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30
7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30
8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30
10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30
11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30	11.30
12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30	12.30
13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30
14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30	14.30
15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30	15.30
16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30	16.30
17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30	17.30
18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30
19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30
20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30	20.30
21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30	21.30
22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30	22.30
23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30	25.30

23 30 471
0 30 481
0 30 491
1 30 501
2 30 511
2 30 521
3 30 531
3 30 541
4 30 551
5 30 561
5 30 571
6 30 581
6 30 591
6 30 601
7 30 611
7 30 621
7 30 631
8 30 641
8 30 651
9 30 661
9 30 671
10 30 681
10 30 691
11 30 701
11 30 711
12 30 721
12 30 731
13 30 741
13 30 751
14 30 761
14 30 771
15 30 781
15 30 791
16 30 801
16 30 811
17 30 821
17 30 831
18 30 841
18 30 851
19 30 861
20 30 871
20 30 881
21 30 891
21 30 901
22 30 911
22 30 921
23 30 931
23 30 941
24 30 951
24 30 961
25 30 971
25 30 981
26 30 991
26 30 1001
27 30 1011
27 30 1021
28 30 1031
28 30 1041

[illegible]

PEAK OUTFLOW IS 182. AT TIME 43.50 HOURS

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
182.	151.	77.	31.		3754.
5.	4.	2.	1.		106.
	5.42	10.97	11.19		11.19
	279.07	279.07	284.27		284.27
	137.60	137.60	137.60		137.60
	152.	152.	152.		152.
	93.	188.	191.		191.
	93.	188.	191.		191.

OVF

STATION

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

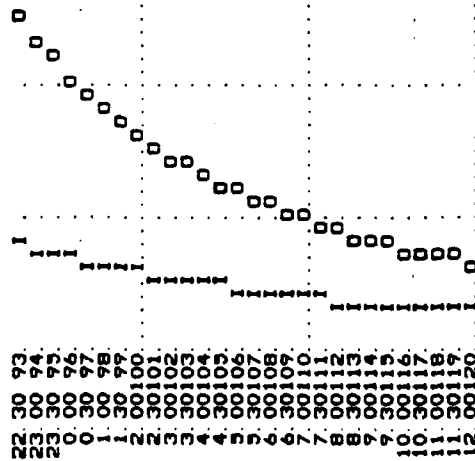
[illegible]

450 0 0 0 0

FLAHERTY GIAVARA ASSOCIATES, P. C.

350 I
30 360 I
18 30 370 I
19 30 380 I
19 30 390 I
20 30 400 I
20 30 411
21 30 421
21 30 431
21 30 441
22 30 451
22 30 461
22 30 471
22 30 481
22 30 491
22 30 501
22 30 511
22 30 521
22 30 531
22 30 541
22 30 551
22 30 561
22 30 571
22 30 581
22 30 591
22 30 601
22 30 611
22 30 621
22 30 631
22 30 641
22 30 651
22 30 661
22 30 671
22 30 681
22 30 691
22 30 701
22 30 711
22 30 721
22 30 731
22 30 741
22 30 751
22 30 761
22 30 771
22 30 781
22 30 791
22 30 801
22 30 811
22 30 821
22 30 831
22 30 841
22 30 851
22 30 861
22 30 871
22 30 881
22 30 891
22 30 901
22 30 911
22 30 921
22 30 931
22 30 941
22 30 951
22 30 961
22 30 971
22 30 981
22 30 991
22 30 1001

FLAHERTY GIAVARA ASSOCIATES, P. C.



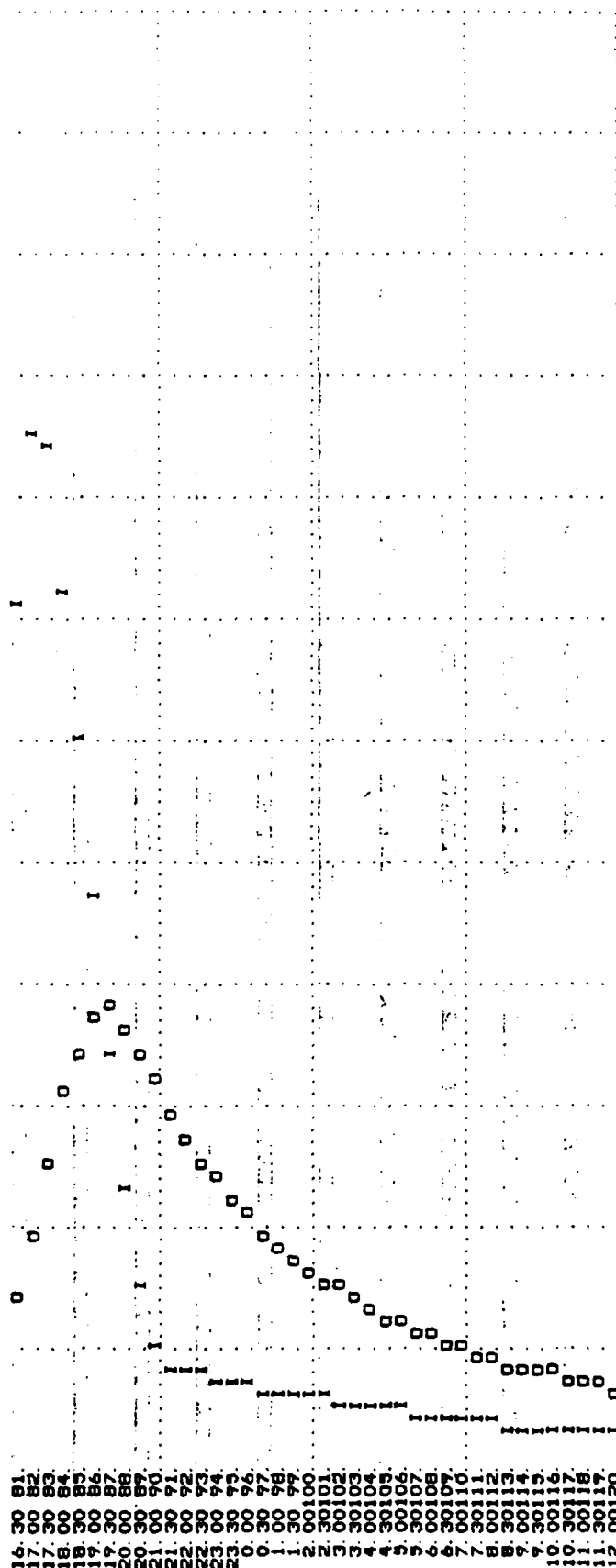
OVN

STATION 1, PLAN 1, RATIO 7
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW	STORAGE
000001127	00000N1
174	00000N1
178	00000N1
181	00000N1
184	00000N1
187	00000N1
190	00000N1
193	00000N1
196	00000N1
199	00000N1
202	00000N1
205	00000N1
208	00000N1
211	00000N1
214	00000N1
217	00000N1
220	00000N1
223	00000N1
226	00000N1
229	00000N1
232	00000N1
235	00000N1
238	00000N1
241	00000N1
244	00000N1
247	00000N1
250	00000N1
253	00000N1
256	00000N1
259	00000N1
262	00000N1
265	00000N1
268	00000N1
271	00000N1
274	00000N1
277	00000N1
280	00000N1
283	00000N1
286	00000N1
289	00000N1
292	00000N1
295	00000N1
298	00000N1
301	00000N1
304	00000N1
307	00000N1
310	00000N1
313	00000N1
316	00000N1
319	00000N1
322	00000N1
325	00000N1
328	00000N1
331	00000N1
334	00000N1
337	00000N1
340	00000N1
343	00000N1
346	00000N1
349	00000N1
352	00000N1
355	00000N1
358	00000N1
361	00000N1
364	00000N1
367	00000N1
370	00000N1
373	00000N1
376	00000N1
379	00000N1
382	00000N1
385	00000N1
388	00000N1
391	00000N1
394	00000N1
397	00000N1
400	00000N1
403	00000N1
406	00000N1
409	00000N1
412	00000N1
415	00000N1
418	00000N1
421	00000N1
424	00000N1
427	00000N1
430	00000N1
433	00000N1
436	00000N1
439	00000N1
442	00000N1
445	00000N1
448	00000N1
451	00000N1
454	00000N1
457	00000N1
460	00000N1
463	00000N1
466	00000N1
469	00000N1
472	00000N1
475	00000N1
478	00000N1
481	00000N1
484	00000N1
487	00000N1
490	00000N1
493	00000N1
496	00000N1
499	00000N1
502	00000N1
505	00000N1
508	00000N1
511	00000N1
514	00000N1
517	00000N1
520	00000N1
523	00000N1
526	00000N1
529	00000N1
532	00000N1
535	00000N1
538	00000N1
541	00000N1
544	00000N1
547	00000N1
550	00000N1
553	00000N1
556	00000N1
559	00000N1
562	00000N1
565	00000N1
568	00000N1
571	00000N1
574	00000N1
577	00000N1
580	00000N1
583	00000N1
586	00000N1
589	00000N1
592	00000N1
595	00000N1
598	00000N1
601	00000N1
604	00000N1
607	00000N1
610	00000N1
613	00000N1
616	00000N1
619	00000N1
622	00000N1
625	00000N1
628	00000N1
631	00000N1
634	00000N1
637	00000N1
640	00000N1
643	00000N1
646	00000N1
649	00000N1
652	00000N1
655	00000N1
658	00000N1
661	00000N1
664	00000N1
667	00000N1
670	00000N1
673	00000N1
676	00000N1
679	00000N1
682	00000N1
685	00000N1
688	00000N1
691	00000N1
694	00000N1
697	00000N1
700	00000N1
703	00000N1
706	00000N1
709	00000N1
712	00000N1
715	00000N1
718	00000N1
721	00000N1
724	00000N1
727	00000N1
730	00000N1
733	00000N1
736	00000N1
739	00000N1
742	00000N1
745	00000N1
748	00000N1
751	00000N1
754	00000N1
757	00000N1
760	00000N1
763	00000N1
766	00000N1
769	00000N1
772	00000N1
775	00000N1
778	00000N1
781	00000N1
784	00000N1
787	00000N1
790	00000N1
793	00000N1
796	00000N1
799	00000N1
802	00000N1
805	00000N1
808	00000N1
811	00000N1
814	00000N1
817	00000N1
820	00000N1
823	00000N1
826	00000N1
829	00000N1
832	00000N1
835	00000N1
838	00000N1
841	00000N1
844	00000N1
847	00000N1
850	00000N1
853	00000N1
856	00000N1
859	00000N1
862	00000N1
865	00000N1
868	00000N1
871	00000N1
874	00000N1
877	00000N1
880	00000N1
883	00000N1
886	00000N1
889	00000N1
892	00000N1
895	00000N1
898	00000N1
901	00000N1
904	00000N1
907	00000N1
910	00000N1
913	00000N1
916	00000N1
919	00000N1
922	00000N1
925	00000N1
928	00000N1
931	00000N1
934	00000N1
937	00000N1
940	00000N1
943	00000N1
946	00000N1
949	00000N1
952	00000N1
955	00000N1
958	00000N1
961	00000N1
964	00000N1
967	00000N1
970	00000N1
973	00000N1
976	00000N1
979	00000N1
982	00000N1
985	00000N1
988	00000N1
991	00000N1
994	00000N1
997	00000N1
1000	00000N1

FLAHERTY GIARARA ASSOCIATES, P.C.

11 30 00 231
12 30 00 241
13 30 00 251
14 30 00 261
15 30 00 271
16 30 00 281
17 30 00 291
18 30 00 301
19 30 00 311
20 30 00 321
21 30 00 3301
22 30 00 3401
23 30 00 350
24 30 00 360
25 30 00 3701
26 30 00 3801
27 30 00 3901
28 30 00 4001
29 30 00 411
30 30 00 421
31 30 00 431
32 30 00 441
33 30 00 451
34 30 00 461
35 30 00 471
36 30 00 481
37 30 00 491
38 30 00 501
39 30 00 511
40 30 00 521
41 30 00 531
42 30 00 541
43 30 00 551
44 30 00 561
45 30 00 571
46 30 00 581
47 30 00 591
48 30 00 601
49 30 00 611
50 30 00 6201
51 30 00 630
52 30 00 640
53 30 00 650
54 30 00 660
55 30 00 670
56 30 00 680
57 30 00 690
58 30 00 700
59 30 00 710
60 30 00 720
61 30 00 730
62 30 00 740
63 30 00 750
64 30 00 760
65 30 00 770
66 30 00 780
67 30 00 790
68 30 00 800



#DYN#

STATION 1; PLAN 1; RATIO 8
END-OF-PERIOD HYDROGRAPH ORDINATES

multifactorial

0000N-NN
0000N-NN
0000N-NN
0000N-NN
0000N-NN
OUTFLOW
0000N-NN
0000N-NN
0000N-NN
0000N-NN

PEAK OUTFLOW IS 197. AT TIME 43.50 HOURS

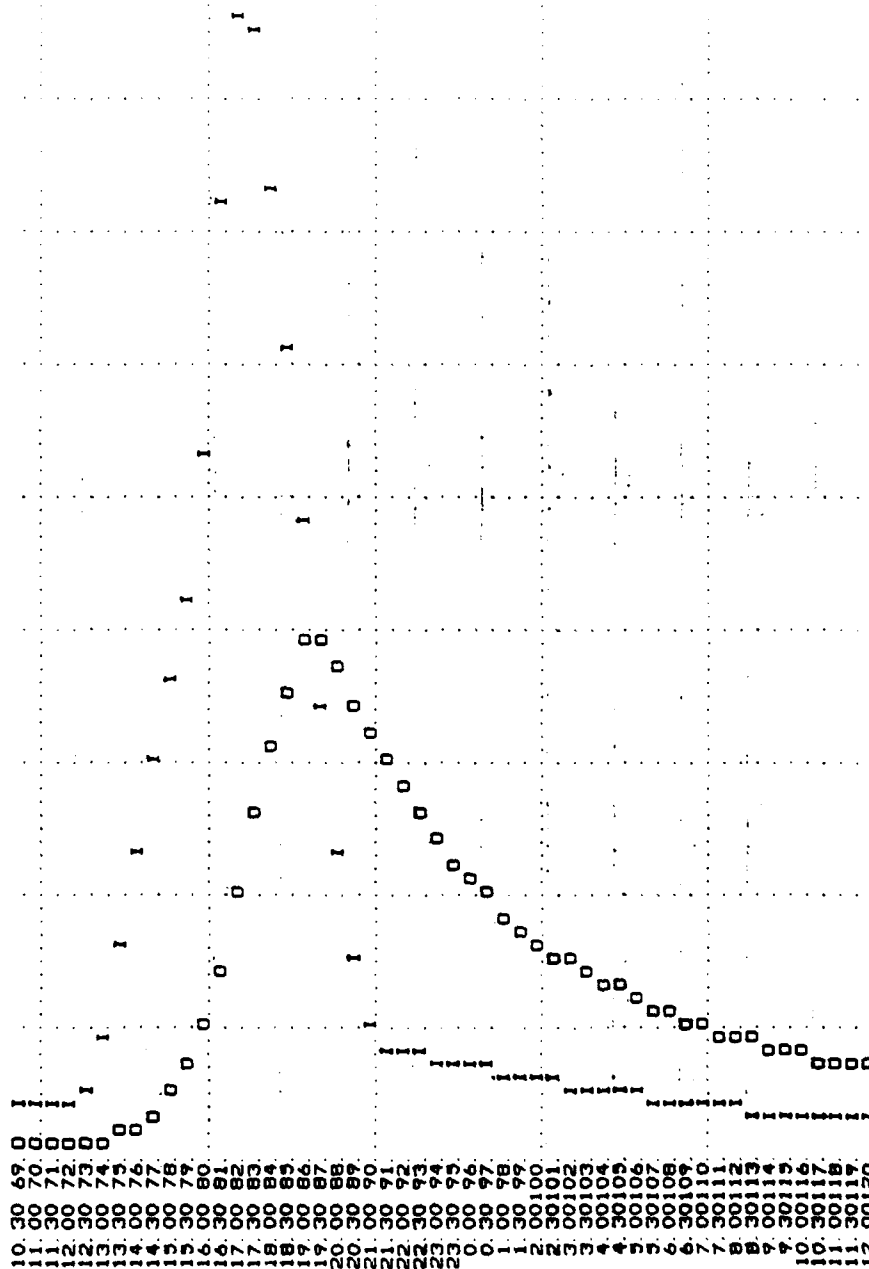
	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CRS	197.	158.	79.	32.	3884.	
CMS	6.	4.	1.	1.	110.	
INCHES		5.65	11.37	11.58	11.98	
MM		143.42	288.77	294.13	294.13	
CU-FT		78.	158.	160.	160.	
THOUS CU M		97.	194.	198.	198.	

♦QVF♦

INFLW(I),	OUTFLOW(O)	AND OBSERVED FLOW(★)	STATION	1
0.	100	150.		
50.	200	250		
	300			

5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

FLAHERTY GIAVARA ASSOCIATES, P. C.



STATION 1, PLAN 1, RATIO 9

OVN

END-OF-PERIOD HYDROGRAPH ORDINATES

[illegible]

PEAK OUTFLOW IS 503. AT TIME 42.50 HOURS

PEAK
503
14

CFB
CMS
INCHES
MM
AC-FT
THOUS CU M

• 200 •

STATION 11

AD-A110 118

FLAHERTY-GIAVARA ASSOCIATES NEW HAVEN CT
NATIONAL DAM SAFETY PROGRAM. NOE POND DAM (INVENTORY NUMBER NY --ETC(U)
JUL 81 H C FLAHERTY

F/O 13/13

DACW51-81-C-0006

NL

IMCI ACKETED

2 OF 2
PAGE 1



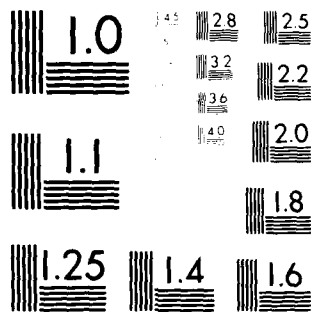
END

DATE

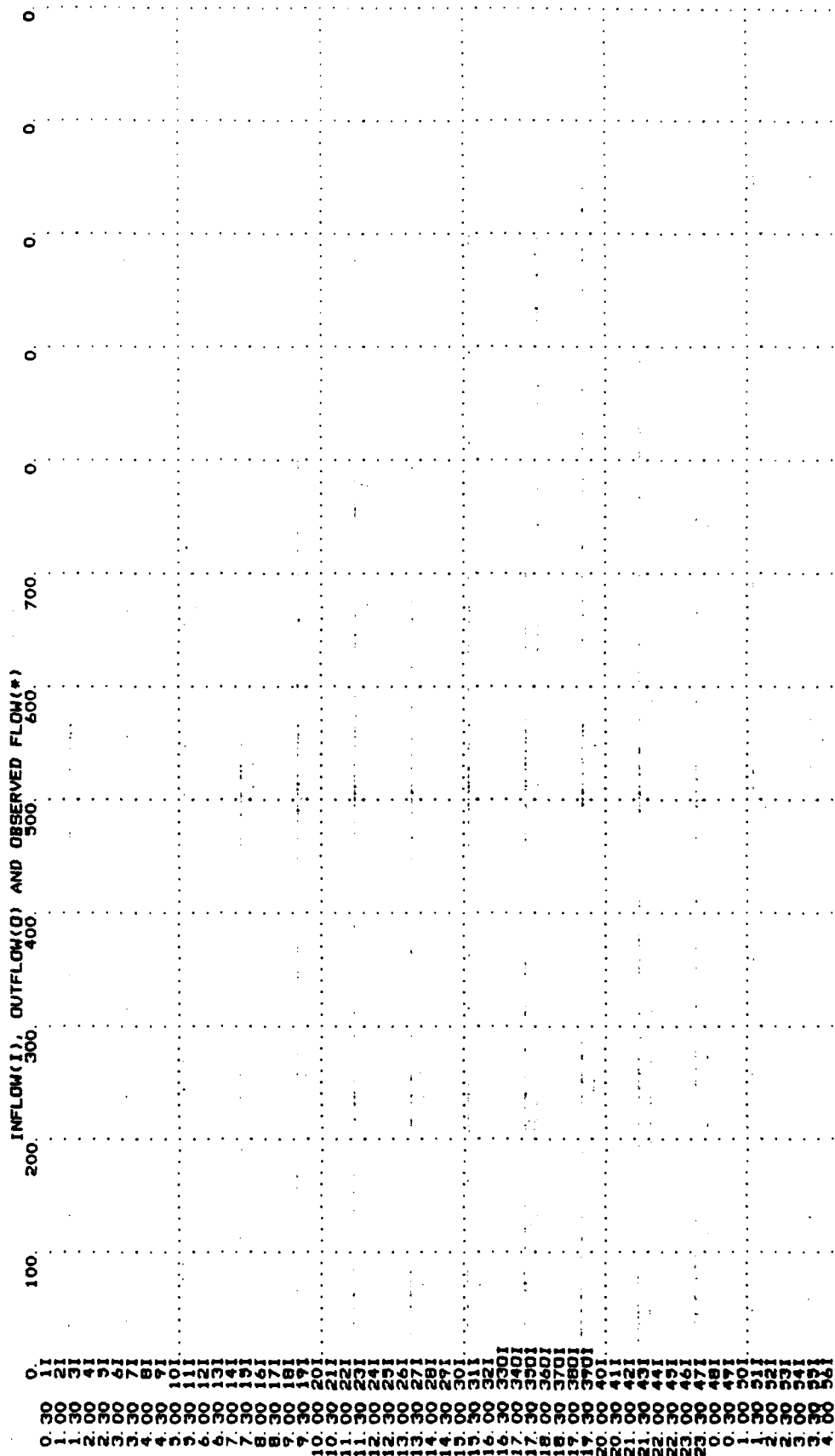
FILMED

8-82

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



FLAHERTY OIAVARA ASSOCIATES, P. C.

[illegible]

C-48

SPENDING: \$1.7M EYE TRACK: 17% PATENT PENDING

000 000
1111111
51141718120
1111111
3001100100
900111112

#GIVE

●●●●●●●●●●

● ● ● ● ● ● ● ●

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
HYDROGRAPH AT	1	0.26 (0.67)	1	330. (9.35)	363. (10.28)	376. (11.22)	403. (11.41)	409. (11.59)	416. (11.78)	423. (11.97)	427. (12.15)	460. (18.70)
	1	0.26 (0.67)	1	135. (3.82)	153. (4.32)	170. (4.81)	173. (4.71)	177. (5.01)	182. (5.15)	189. (5.36)	197. (5.58)	503. (14.26)
ROUTED TO	1	0.26 (0.67)	1	135. (3.82)	153. (4.32)	170. (4.81)	173. (4.71)	177. (5.01)	182. (5.15)	189. (5.36)	197. (5.58)	503. (14.26)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN	RATIO OF PMF	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 1630.00	SPILLWAY CREST 1630.00	TOP OF DAM 1632.94	TIME OF FAILURE HOURS
1	0.50	1632.08	0.00	0.00	178.	0.00
	0.55	1632.25	0.00	0.00	94.	0.00
	0.60	1632.42	0.00	0.00	178.	0.00
	0.61	1632.45	0.00	0.00	94.	0.00
	0.62	1632.47	0.00	0.00	178.	0.00
	0.63	1632.52	0.02	0.00	94.	0.00
	0.64	1632.55	0.03	1.00	178.	0.00
	0.65	1632.58	0.08	1.50	94.	0.00
	1.00	1633.12	0.62	4.00	178.	0.00

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAH SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

PAGE 0040

FLAHERTY GIOVANA ASSOCIATES, P.C.

C-50

REPRODUCTION OF THIS DOCUMENT IS PROHIBITED

APPENDIX D

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

PREVIOUS REPORTS

CONSTRUCTION LAYOUT:
STREETS, HIGHWAYS
BUILDINGS
STRUCTURES

LEON KALMUS

Land Surveyor

418 CHESTNUT STREET
ONEONTA, N. Y. - 13820

PHONE 607-433-3200

NYS LIC. NO. 26695LS

BOUNDARY SURVEYS
SUBDIVISION
TOPOGRAPHIC SURVEYS
CONTROL SURVEYS

February 28, 1968

Leatherstocking Corp.
19 Main Street
Cooperstown, N.Y. 13326

Att: Mr. Bruce Rathbone

Dear Mr. Rathbone:

This is to confirm our telephone conversation of this date regarding the area of Moe Pond.

ASCS photograph No. EHH, 1AA, 42, dated 5/27/60 was used to planimeter the area of Moe Pond. Two successive planimeter readings gave an area of 39 acres. The distortion in this photograph, which would tend to enlarge all objects, was estimated to be approximately 10%.

Therefore, the estimated surface area of Moe Pond was given to you as 35 acres more or less.

Very truly yours,

Leon Kalmus

Leon Kalmus, L.S.

LK/e

PREVIOUS INSPECTION REPORTS

GORDON H. REYNOLDS
PROFESSIONAL ENGR. AND LAND SURVEYOR
110 FAIR STREET
COOPERSTOWN, NEW YORK
PHONE XXXXX 547-9628

May 31, 1972

Leatherstocking Corporation
Cooperstown, N. Y. 13326

Attention: Mr. Bruce Rathbone

Re: Inspection of dam at Moe Pond

Dear Bruce:

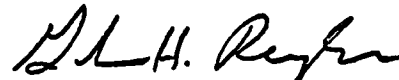
The subject dam was inspected after the heavy rains on May 22, 1972. About 1 inch of water was flowing over the spillway. No seepage was noted at the toe of the dam.

A combination of high water and the lubrication of the soil under an earth fill dam caused by percolation of water can cause failure of an earth filled dam.

In the case of Moe Pond, heavy rains cause only a small increase in water level. This is because the pond is larger in comparison to the total drainage area. The water spreads out - not up. Further, the Moe Pond is surrounded by woodland. This condition slows down the run-off and thereby lessens the chance for a high water condition.

In view of the fact that percolation through the dam and high water condition do not exist during and after heavy rains, I conclude that the Moe Pond Dam is a very safe structure indeed.

Very truly yours,



Gordon H. Reynolds

GHR:mg

APPENDIX E
STRUCTURAL STABILITY ANALYSIS

<u>Section</u>	<u>wt.</u>		<u>Mom.</u>
$3 \times 6 \times .15 =$	2.7^k	$\times 3' =$	8.1^k
$4 \times 10 \times .15 =$	6.0^k	$\times 3' =$	18.0^k
$2 \times 9' \times .15 =$	2.7^k	$\times 3' =$	8.1^k
	<u>11.4</u>	E-1	<u>34.2^k</u>



Loading Case: Normal

$$F_H = 15.34^K + 1.19^K = 16.53^K/Ft$$

$$M_{OT} = 1560.5 + 16 + 9.6 = 1584.1^K$$

$$M_{ecc} = 34.2^K$$

$$F_v = 11.4^K$$

$$F_p = .38^K/s =$$

$$F_{rp} = 19' \times .38 \times \frac{19}{2} = 68.6^K$$

$$M_{RPP} = 68.6 \times \frac{19}{3} = 434.4^K$$

$$F.S.O.T. = \frac{34.2 + 434.4}{1584.1^K} = 2.55 \text{ OK}$$

$$F.S.SL = \frac{(11.4 - 2.9) \cdot 6 + 68.6}{16.53^K} = 4.48 \text{ OK}$$

Loading Case: Normal + Ice

$$F_H = 16.53 + 5 = 21.53^K/Ft$$

$$M_{OT} = 1584.1 + 5 \times 22 = 2694.1^K$$

$$F.S.O.T. = \frac{468.6}{2694.1} = 1.59 \text{ Less than desirable}$$

$$F.S.SL = \frac{9 \times 6 + 68.6}{21.53} = 3.44 \text{ OK}$$

Earth embankments both sides
 provides stability, loc. of res.
 N/A



Loading Case: Max Oper.

$$F_H = 15.34K + 3K = 18.34K$$

$$M_o = 158.5 + 40.5 = 199'K + 9.6 = 203.6'K$$

$$F_v = 11.4$$

$$T_o = 2.4$$

$$F_{Hmax} = 18.34$$

$$F_{Hmax} = 18.34$$

$$F.S. o.T. = \frac{468.6}{203.6} = 2.25 \text{ OK}$$

$$F.S. SL = \frac{54 + 68.6}{18.34} = 4.03 \text{ OK}$$

Loading Case: P.M.F.

Ht. of water 3.0' above spillway

$$F_H = 3.56 + 15.34 = 18.9K$$

$$M_o = 158.5 + 48.16 + 9.6 = 216.16'K$$

$$F.S. o.T. = \frac{468.6}{216.16} = 2.17 \text{ OK}$$

$$F.S. SL = \frac{(11.4 - 2.4) \times 1.6 + 68.6}{18.9} = 3.92 \text{ OK}$$

Loc. of res. N/A

APPENDIX F

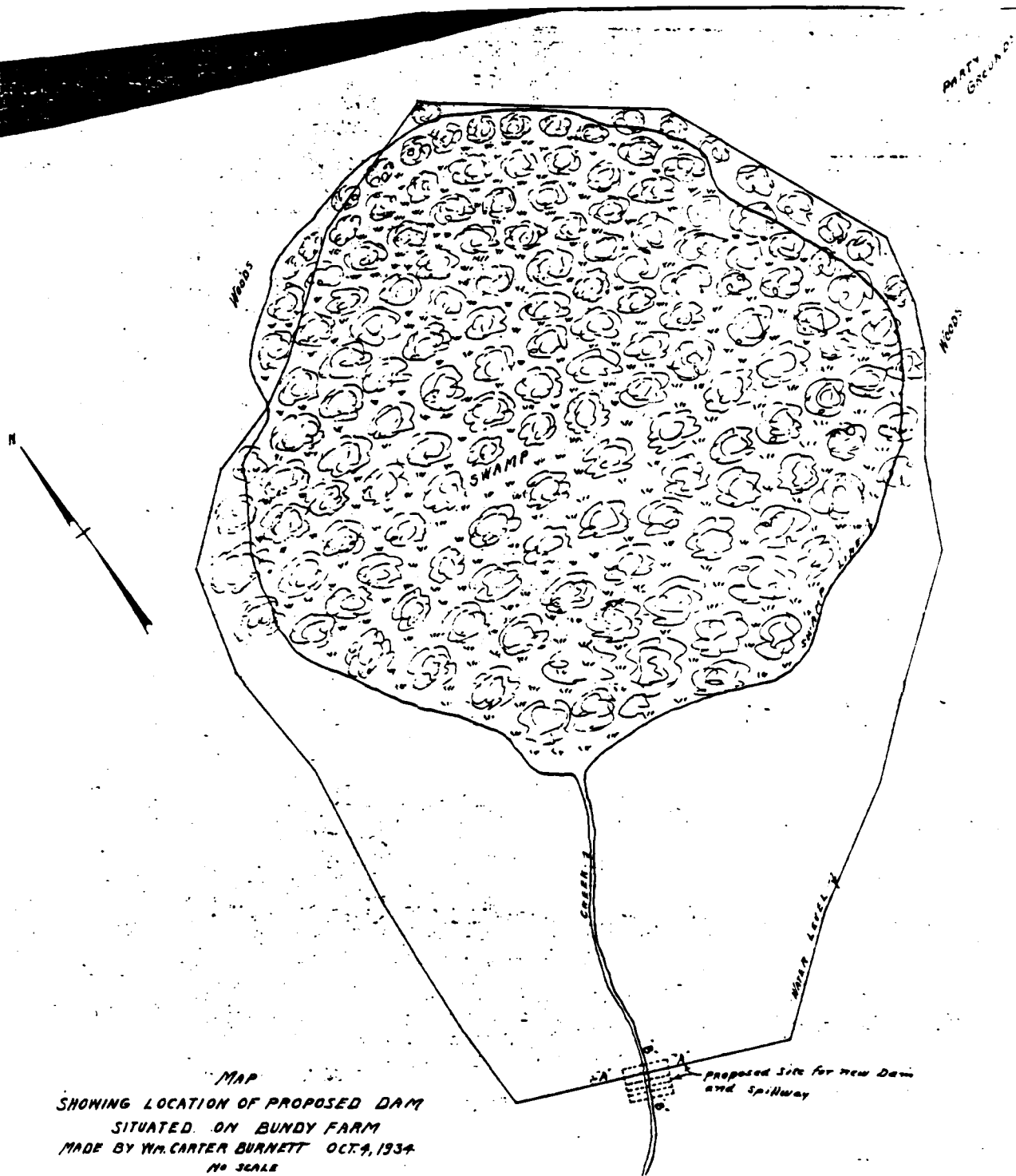
REFERENCES

REFERENCES

1. Chow, Ven Te, Editor - Handbook of Applied Hydrology. McGraw-Hill Book Company, New York, New York, 1964.
2. Hydrologic Engineering Center, U.S. Army Corps of Engineers, HEC-1 Flood Hydrograph Package, Users Manual. Davis, California, January 1973.
3. Hydrologic Engineering Center, U.S. Army Corps of Engineers, Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations, Davis, California, September 1978.
4. King, Horace and Brater, Ernest. Handbook of Hydraulics, 5th Edition. McGraw-Hill Book Company, New York, New York, 1963.
5. Riedel, J.T., Appleby, J.F. and Schloemer, R.W. Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24, and 48 Hours (Hydrometeorological Report No. 33) U.S. Department of Commerce - Weather Bureau and U.S. Department of the Army - Corps of Engineers, Washington, D.C., April 1956
6. U.S. Department of the Interior, Bureau of Reclamation, Design of Small Dams, Second Edition, Washington, D.C., 1973.

APPENDIX G

DRAWINGS



TOP OF PROPOSED DAM

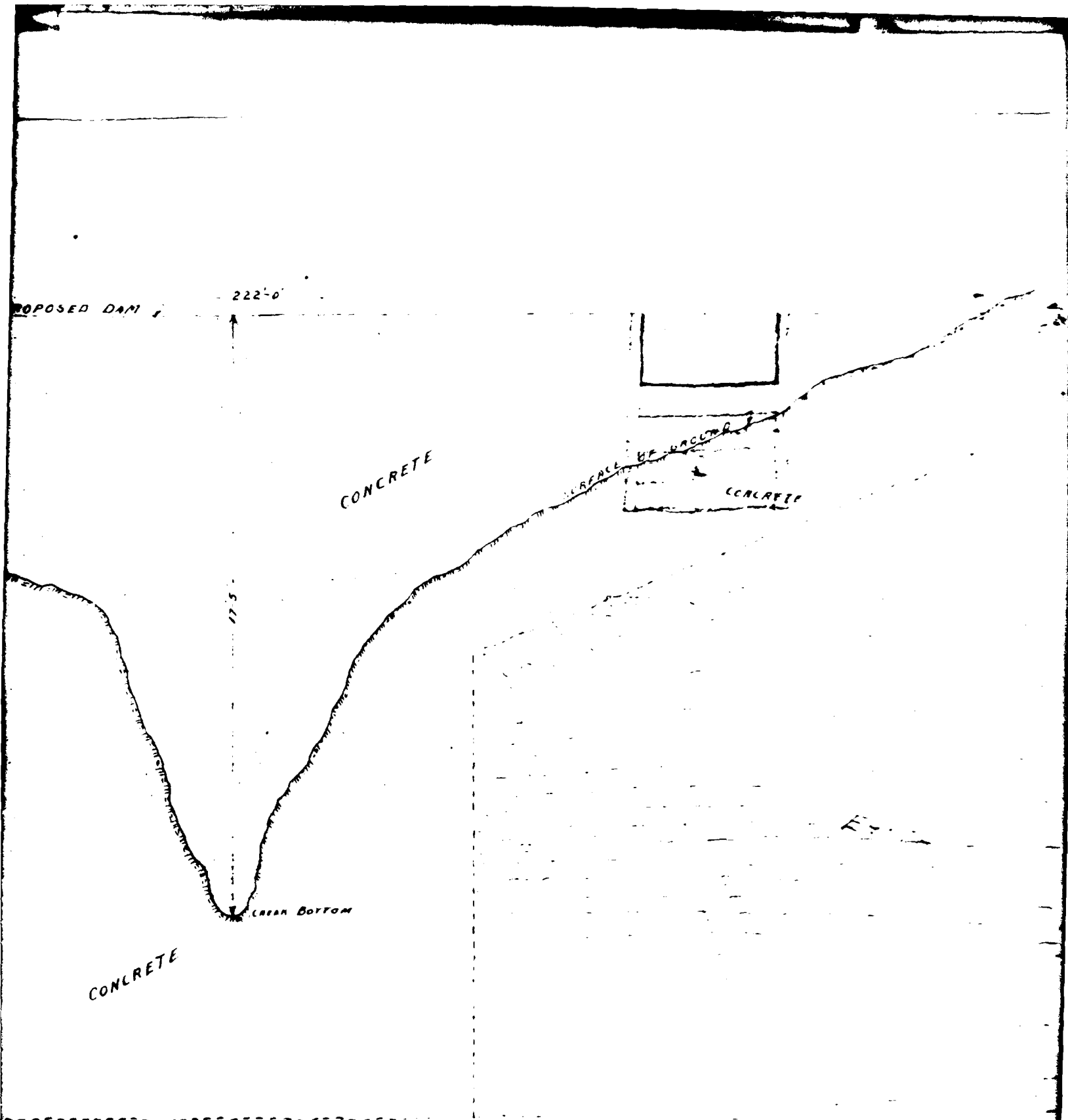
CONCRETE

SURFACE OF GROUND

PROP

CON

SECTION THRU A-A SHOWING
PROP



SHOWING PRESENT SURFACE OF GROUND AND HEIGHT OF PROPOSED DAM

SCALE { HORIZONTAL 1" = 10'
VERTICAL 1" = 10'

